# Developing an understanding of information seeking during the impact phase of a natural disaster

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Barbara Ryan

M.ProfComm (USQ), GCTertTeaching(USQ),
B.Arts (Communication) (MCAE)

School of Property, Construction and Project Management

College of Design and Social Context

**RMIT University**

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# Statement of original authorship

I certify that the ideas, research work, results, analyses and conclusions reported in this dissertation are entirely my effort, except where otherwise acknowledged. I also certify that this work has not been previously submitted for a degree or diploma in any university. To the best of my knowledge and belief, this thesis contains no material previously written or published by another person, except where due reference is made in the thesis itself, and with the exception of this statement of original authorship.

*Signature of candidate:* _____ Date: _____

**Endorsement**

*Signature of Principal Supervisor*

_____ Date:_____
Dr Christina Scott-Young

*Signature of Co-Supervisors*

_____ Date:_____
Associate Professor Tayyab Maqsood

_____ Date: _____
Dr Keith Toh

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# Abstract

The purpose of this thesis was to find out if existing information models could be used to describe information seeking in a disaster, what type of information seeking patterns exist in a disaster, and whether a disaster information seeking model might be able to guide disaster communication practice. The research reviewed literature on human behaviour in disaster and information seeking in a disaster. While no models were found that illustrated the disaster information seeking process, a model developed by Mileti and Sorensen (1990) attempted to explain influences on risk communication. In addition, a model of problem-specific every day life information seeking (Savolainen 2008b) was reviewed that could possibly be adapted to disaster. This study uses these two models to develop a model of disaster information seeking.

The disaster information seeking model was improved using three research methods. They were semi-structured interviews of 51 disaster-experienced respondents, an online and mailed survey that attracted 345 respondents, and a focus group of six disaster communication practitioners and researchers. Each of these methods contributed to further development of the model, and the first two methods established a number of information seeking pathways possible in disaster. A feature of the interviews and survey was the influence of disaster type on information seeking behaviour – in particular, bushfire, cyclone, slow flood and flash flood. The focus group then investigated the usefulness of the model. Changes were made that the practitioners and researchers felt would make the model more useful and which were also supported by the literature and results of the interviews and survey.

Key findings from the interviews were specific to disaster type, which was expected after the literature review. Example information seeking pathways were established, with a dominant pathway for each disaster: flash flood was hearing about it from other people and then using television as a confirmation source; for slow flood, environmental cues alerted people to the possibility of a coming flood, followed by confirmation with other people; in a bushfire, other people were the alert source and the confirmation source; in a cyclone the alert sources were the Bureau of Meteorology (BOM) website and commercial radio, and the confirmation

source was weather websites, including BOM. In flash flood, the key information need was to make sense of what had happened and how it had affected their own local community; in a slow flood, it was about the flood peak and how it would affect their own and family's property; in a bushfire, it was about the location and path of the bushfire and the welfare of family and friends; in a cyclone it was the path of the cyclone before it hit and the level of damage after, and how friends and family had fared. The model developed from the literature review was subject to some change after the analysis of the interviews.

The survey confirmed the disaster specific nature of information seeking. In a flash flood, other people and environmental cues were most prevalent alert sources, with the confirmation source news and weather websites. In a slow flood, television and radio were the key alert sources, followed by news and weather websites. People in a cyclone learned about it form a news or weather website and confirmed using a different source with this same form cluster; in bushfire the alert sources was environmental cues followed by an agency website; in a storm, other people then television or radio; earthquake was environmental cues and then other people, radio or emergency agency staff; tornado was television or news or weather website confirmed by other people or environmental cues; tsunami was other people directly then news or weather website; and mudslide was other people directly then news or weather website. There seemed to be differences between participants in information seeking relating to age, gender, household size, education, proximity to the disaster, and the type of community people lived in. Changes were made to the model as a result of the survey analysis.

The industry focus group confirmed the validity of the model, with 'filters' adopted in place of 'effect of situational factors', a personalisation trigger was added and the point at which people exit the information seeking process was also added, with an option to re-enter at any time.

As a result, a final model of disaster information seeking was established. It describes the process of information seeking, influences on choices of source and form, and plots the triggers for either action or return to further information seeking. It also accounts for the importance of information sources and the tendency for people to return to a few trusted sources throughout the information

seeking process. The model appears to provide a solid foundation for practice, and is ready for testing in further research.

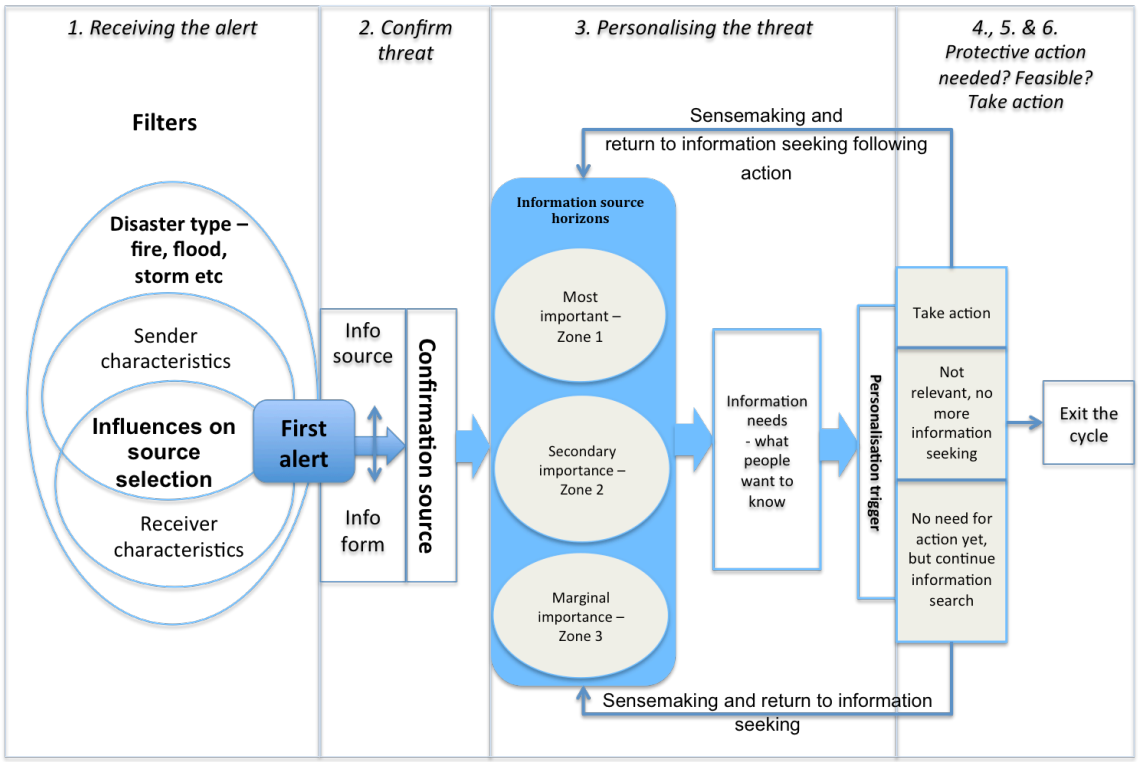



**Figure - A model for disaster information seeking**

# 1. Introduction

## 1.1. Background to the research

In a natural disaster, communication and interaction with affected and neighbouring communities is a critical component of emergency management (Gilbert 1998, p. 16; Haddow & Bullock 2006, pp. 7, 195; Quarantelli 1986, pp. 2-5; 1988c; 1989a, pp. 1-2, 23-5; 1996; 1996, p. 76; Young Landesman 2005). Veil (2007, p. 337) found that residents of one particular community affected by a disaster "...considered communication a key aspect of the emergency response...". The timely release of information helps reduce anxiety levels and "unnecessary care-seeking by threatened populations" and facilitates relief efforts (Wray et al. 2004, p. 232). In at least one case in a bushfire in Australia, the right information about the location of the bushfire has been attributed to survival by a sizeable number of people from the affected community (McLennan et al. 2011). Early warnings combined with risk information and prepared communities have been shown in Bangladesh, Chile and The Philippines to significantly reduce mortality (United Nations 2015). Community disaster decision-making and the possession of information have been consistently connected (Helsloot & Ruitenberg 2004): "Citizens who do not have adequate information to assess the situation, the risks and possible actions, might make choices that – observing from a greater distance, with more overview – may be perceived as sub-optimal" (Helsloot & Ruitenberg 2004, p. 110). Access to information is critical for survival in some disasters (Legates & Biddle 1999). The 2005 Hyogo Framework For Action identifies five priorities for action (United Nations 2005), three of which will be achieved by providing communities with information and opportunities for engagement:

- To identify, assess and monitor disaster risk and enhance early warning;
- Use knowledge, innovation and education to build a culture of safety and resilience at all levels; and
- Strengthen disaster preparedness for effective response at all levels.

Provision of information to the community in the past has not been done well in all phases of a disaster (Haddow & Bullock 2006; Quarantelli 1988d), or even considered by some as important (see the treatment of post-preparedness communication in Coppola 2007; Veil 2007) and this may affect the response of communities in future disasters (Apan et al. 2010). Becker (2004) noted that lack of information can cause fear, which translates into responses that put people at risk and make managing the disaster more difficult. In fact, some argue that the nuclear accident at Three Mile Island was not an operational

incident, but an emergency caused by bad communication (Sandman 2004). New technology such as mobile phones and social media make it much easier to communicate (United Nations 2015) even in developing countries. For example, in sub-Saharan Africa, 10 per cent of the population owned a mobile phone in 2005 – this was 80% by 2015 (United Nations 2015). However, progress in making use of technology has lagged behind – with inadequate links between geological and meteorological services and lack of standardisation of warnings across countries (United Nations 2015).

While a sound body of research and discussion has occurred on warnings for disasters (Donner, Rodriguez & Diaz ; Drabek 1999, 2001; Emergency Management Australia 2008; Fitzpatrick & Mileti 1994; Hellier et al. 2007; Keys & Cawood 2009; Leik et al. 1981) and risk communication (Chess, Salomone & Sandman 1991; Covello, Minamyer & Clayton 2007; Fitzpatrick & Mileti 1994; Glik et al. 2004; Haynes, Barclay & Pidgeon 2007; Mileti & Fitzpatrick 1992; Pennings & Grossman 2008), much less complete research appears to have been conducted on how people look for information when they are in the midst of a crisis or natural disaster (Coombs 2007a; Coombs & Holladay 2008; Perez-Lugo 2004; Waymer & Heath 2007). In fact, Waymer and Heath (2007) reported that crisis communication is usually studied from the management perspective and never from the view of an organisation's stakeholders. Some exceptions to this are found in disaster research (Blake et al. 2004; Hayden et al. 2007; National Weather Service Central Region 2011; Palen et al. 2009; Paul 1999; Piotrowski & Armstrong 1998; Seeger et al. 2002), but discussion has not been coherently presented to provide a clear picture of information seeking behaviour in the impact phase of a disaster. For example, research generally focuses on a topic than can encompass some information seeking behaviour (such as evacuations or decision making), but does not deal with information seeking specifically; or looks at information seeking behaviour using one or a cluster of specifics or technologies (for example, social media or mainstream media use), rather than a comprehensive view (Alliance Strategic Research 2011; American Red Cross 2011; Australian Bureau of Statistics 2007d; Barton 1970; Cate 1994; Erikson 1976; Esplin, Gill & Enright 2003; Fischer III et al. 1995; Fu et al. 2010; Goudie 2007; Jones & Rainie 2002; King 2006; National Weather Service Central Region 2011; Piotrowski & Armstrong 1998; Prater, Wenger & Grady 2000; Procopio & Procopio 2007; Stempel III & Hargrove 2002; Taylor, K. et al. 2009).

In Australia, a number of papers gave an insight into what sources people received information from when faced by flood and bushfire while studying broader behaviour in those disasters (Cohen, Hughes & White 2007; Goudie & King 1997; Mackie, McLennan & Wright 2013; McLennan 2014). There was some reference to what people were looking for,

but this topic was not explored in depth in most studies because of other priorities for each project. A study of the 2015 Sampson Flat, South Australia bushfire included a section on information and warnings on the day of the fire, providing a starting structure for information seeking behaviour in bushfire (Every et al. 2015). A further paper on the use of social media in the Victoria floods in 2011 (Alliance Strategic Research 2011) made a valuable contribution, but had obvious limitations in that it made no comparisons between social media use and other information sources. None of these studies examine use or importance of all available information sources, or sequences of information seeking. More comprehensive research into information seeking behaviour during disasters has been undertaken in the United States (such as Becker 2004; Burger et al. 2013; Chesser et al. 2006; National Weather Service Central Region 2011; Piotrowski & Armstrong 1998; Wray et al. 2004) and China (such as Fu et al. 2010). However, even with the addition of a number of studies undertaken in New York after the September 11, 2001 terrorist attacks (including Greenberg 2002; Greenberg, Hofschire & Lachlan 2002; Seeger et al. 2002), the amount of published research that gives the full picture of information seeking behaviour of people who are experiencing a disaster is still very small.

Some natural disasters have shown that local conventional media cannot always be relied upon because of breakdown of utility and communication structures. The Boxing Day 2004 tsunami that affected communities living on the edge of the Indian Ocean, the March 2006 Cyclone Larry in North Queensland, Australia, the September 11, 2001 terrorist attacks and Superstorm Sandy in October 2012, both in New York, are examples of the frailty of power supply and technology (Bureau of Meteorology 2007; Burger et al. 2013; Greenberg 2002; McLiskey 2007). The Office of Communication at the United States' Centers for Disease Control and Prevention has, as a result of Hurricane Katrina, adapted its communication processes to reduce reliance on media and technology and to tap more into local social and business networks that can disperse face-to-face messages quickly and efficiently (Vanderford et al. 2007). Knowing the information seeking behaviours and preferences of a community experiencing a disaster, and their access to communications, is therefore critical for the agencies involved.

As disasters become more frequent and more costly (Coppola 2007), better communication may contribute to them becoming less deadly (Cate 1994). This thesis explores how people search for and find information about their situation during the impact phase of a natural disaster. It is hoped that this research will:

- add to knowledge on the sources of information people use and consider important, their information seeking patterns, and the types information they look for;
- help emergency agencies in Australia, and perhaps other nations, better plan communication with communities in these circumstances; and
- add to research into information seeking and decision making in a disaster.

## 1.2. Research problem and aims

This research aims to find out how individuals in communities look for information about a disaster affecting them, what sources they use, and which they prefer. It will attempt to find a model that may assist emergency agencies to identify information seeking behaviour in the impact phase of a disaster, which may then aid the development of communication plans for disasters in different regions. A definition of the impact phase of a disaster is developed later in this chapter. This study will not venture into message design, which has already been comprehensively covered in research by Emergency Management Australia (2008). It will also not be concerned with information seeking or communication by emergency agencies or their staff, or between emergency agencies and personnel.

The research questions are:

*How do people look for information during the impact phase of an emergency*

a) *Can information models, which are well-established theory, be used to describe how people look for information during the impact phase of a disaster?*
b) *What information seeking patterns emerge from the impact phase of a disaster?*
c) *Can this knowledge extend known information theory and guide emergency agencies, as strategy and practice?*

## 1.3. Contribution

This thesis makes a number of contributions to existing knowledge on disaster information seeking:

- it establishes and attempts to validate a model of information seeking in a disaster by individuals;
- it maps information seeking patterns by mostly Australian individuals in four different disaster types – flash flood, slow flood, cyclone and bushfire; and

- it attempts to lay the foundation for emergency agencies for effective communication with communities during the impact phase of disasters.

It is unique because:

- it provides a foundation for mapping information seeking behaviour in specific contexts;
- it starts the mapping process in a country where information seeking behaviour has not been examined before; and
- it could be used in conjunction with models that explain both behaviour motivations and decision making in disaster to provide a complete disaster behaviour picture.

## 1.4. Justification for the research

The research for this thesis was justified because**:**

- communication by agencies in disasters has been demonstrated to be problematic in the past (Ryan & Matheson 2010);
- there were gaps in the literature on information seeking in disaster;
- there was no holistic method of examining disaster information behaviour; and
- there are anticipated benefits to applying this research to emergency management, even to the extent that lives may be saved (Legates & Biddle 1999).

## 1.5. Methodology

An inductive approach, social constructivism, was adopted for this exploratory study for two reasons. The first was that no directly applicable model of disaster information seeking emerged from the literature – using an inductive approach such as this, a theory or model is the outcome of research (Bryman 2001). The second was that previous research had not articulated clear patterns of information seeking in a disaster, nor had it determined if the type of disaster influenced information seeking behaviour. These aspects of the existing body of knowledge also pointed to a mixed methods approach, which the social constructivist paradigm supports (Bryman 2001). In addition, social constructivism is particularly concerned with knowledge being a product of social interaction, interpretation and understanding, with this interaction causing changes to both subject and environment (Adams 2006; Talja, Tuominen & Savolainen 2005), which is appropriate for this research problem.

The qualitative and quantitative methods used for this study were:

- initial literature review in the fields of disaster behaviour, which identified the lack of a suitable model or theory;
- a second literature review of the information seeking body of knowledge to identify an appropriate information seeking model for potential use in a natural disaster context;
- development of a suitable information seeking model from these two bodies of research;
- semi-structured interviews and subsequent thematic analysis, which explored and confirmed the research issues presented in this thesis and established preliminary information behaviour patterns to adapt the information seeking model to the context of the impact phase of a natural disaster. The interviews covered four of the most common disasters in Australia – only resourcing and access to communities that had experienced other disaster types restricted the scope of the interviews conducted;
- a survey (administered online and by post), which led to the identification of further tools that can be used to secure definitive data in information seeking behaviour in the impact phase of an emergency. The survey provided descriptive data of participants and allowed a number information seeking patterns to be identified; and
- a focus group of disaster communication researchers and practitioners to discuss and review the emerging model of information seeking in a disaster.

These methods are detailed in Chapters 3, 4 and 5.

## 1.6. Outline of the thesis

This thesis has seven chapters. This chapter (Chapter 1), provides an overview of the research and establishes the research problem as well as examining the justification and contribution of the research, and provides definitions and delimiters that provide some parameters for the research project. Chapter 2 reviews the parent theories of the field: human behaviour in a disaster and everyday life information seeking. Problem-specific everyday life information seeking theory shows potential for explaining information seeking in a disaster context, particularly when it is informed by disaster behaviour thought and a risk communication model. Research questions that emerge during Chapter 2 are summarised at the end of that chapter.

Chapter 3 introduces the research paradigm that was used to guide selection of the methodologies, discusses qualitative research, and details the selection of three of these methods for the research and describes in detail how each method was established and

conducted. Phase one was in-depth interviews, phase two online and mailed surveys, and phase three a focus group. The ethical considerations and approvals for each research phase are also explained in Chapter 3.

Chapter 4 details phase one of the research, which was in-depth interviews with 51 people in four disaster-affected communities representing flash flood, slow flood, bushfire and cyclone. The results are reported and analysed by both manual and software-facilitated thematic analysis. The findings are used to improve the disaster information seeking model developed in Chapter 2, and to establish preliminary information seeking behaviour.

Phase two of the research is recounted in Chapter 5. This reports the results of a survey conducted online and by mail, which attracted 345 responses. The results are reported and analysed, and further adaptations made to the model as a result. A new version of the disaster information seeking model is presented. In addition, a larger bank of possible information behaviours was developed from the data.

In Chapter 6, phase three of the research is explained, which was a focus group of disaster communication practitioners and researchers. The participants reviewed the model for its usability in a practical setting and its ability to help them understand information seeking behaviour in a disaster. A number of changes were recommended. These recommendations were compared for suitability and fit with the literature review and outcomes of the interviews and survey before the model was amended.

Chapter 7 draws conclusions and examines the implications of this research. It summarises the process used to reach these conclusions and will remind the reader of the broader picture as it appeared after each step in the research process. It summarises the Chapter 6 research findings against each research question and discusses how these fit into the literature. It also describes the overall finding against the central questions of this thesis, which are:

*How do people look for information during the impact phase of an emergency?*

a) *Can information models, which are well-established theory, be used to describe how people look for information during the impact phase of a disaster?*
b) *What information seeking patterns emerge from the impact phase of a disaster?*
c) *Can this knowledge extend known information theory and guide emergency agencies, as strategy as practice?*

## 1.7. Definitions

This section will define the concepts of information seeking, disaster and its phases in order to place this study into context and to allow the researcher to set parameters around the period to be examined within a disaster.

### *1.7.1. Disaster*

Definitions of disaster come from a range of fields, including geography, anthropology, sociology, development studies, health sciences and geophysical sciences (Alexander 2005) as well as disaster social sciences (Perry & Quarantelli 2005; Quarantelli 1998).

In the discussion of definitions of disaster, writers have approached the problem from a number of different view points. Perry (2005, p. 314) and Gilbert (1998) noted that at least three different perspectives predominated in one focused discussion on definitions: the practitioner view that provided a basis for practice and policy enabling; definitions that held implications for social action and allowed consideration of community resilience and vulnerability; and an analytic approach in which typologies dominated.

While Perry states that disaster research can continue without consensus on a definition (Perry 2005, p. 316), and Case supports this in relation to other fields (2008, p. 61), he also laments the lack of theory development that has accompanied research in the field which he says will prevent the field from predicting and reducing the impact of "disaster outcomes" (p. 323). If one of the features of many theories and models is their ability to predict behaviour (Case 2008, p. 122), and specifically in this dissertation human behaviour relating to information seeking, the practical definitions that describe events rather than social outcomes will not be appropriate for use in this study. For example, New South Wales State Emergency and Rescue Management Act (1989) describes an emergency as:

"...an emergency due to an actual or imminent occurrence (such as fire, flood, storm, earthquake, explosion, terrorist act, accident, epidemic or warlike action) which:

(a) endangers, or threatens to endanger, the safety or health of persons or animals in the State, or

(b) destroys or damages, or threatens to destroy or damage, property in the State, being an emergency which requires a significant and co-ordinated response."

The focus of this and similar definitions on specific events and their physical impact (which Wenger describes as the disaster agent (1978, p. 25)) leaves no room for subsequent human behaviour in response to these events. Kroll-Smith and Gunter (1998) illustrate the shortcomings of these event and resource-focused definitions, giving examples of several smaller disasters in the US that did not fall neatly into these definitions. In particular, the definitions ignore the detrimental impacts to social networks, economics of communities and cultural attachment to geographic and social regions. For these reasons, definitions that fall into the "practitioner view" (Gilbert 1998; Perry 2005, p. 314), including most agency definitions, will not be considered here.

The other two perspectives identified by Perry (2005) and Gilbert (1998) will provide a basis for discussion on definitions. Hewitt (1998, p. 2, Section 102.2) reports that social understanding is the more critical issue for those who attempt to define disaster than the physical or geological cause of the disaster itself. The involvement of people and the destruction of human and social networks, are, after all, what transforms a physical event into a disaster (Gilbert 1998; Quarantelli 1993) and could be a primary reason that sociologists have led attempts derive a definition of disaster (Barton 1970; Carr 1932; Dynes 1991; Gilbert 1998; Quarantelli 1986).

This research will look at the information needs of communities affected by a disaster, so settling on a suitable definition of disaster from the many that have been proposed will be an important step toward selection or development of a theory as a framework for the study. That this research will focus on communication networks within communities allows a focus on a sociological approach, although the sociological foundations will not be explored.

#### 1.7.1.1. The typology perspective

Apart from the social impact and vulnerability that disasters generate, discussions on definitions have also occurred around the difference between emergencies, disasters and catastrophes (Quarantelli 2000, 2006). This is not the same as classification of disasters according to the cause, such as natural, technological and political hazards put forward by writers such as Coppola (2007) and Haddow and Bullock (2006). Determining the difference between these will be important for the methodology of this study because definitions involving the size of an event will have implications for aspects such as location of research and the definitions used within research tools.

Quarantelli (1989a, p. 2) offered a definition for 'community type disasters', "…where there is a sudden and major disruption of the everyday routines of urban locality, be it a town, city or metropolitan area as a result of some natural or technological disaster agent that threatens and/or impacts life and property". This definition, however, may not address disruption of such a large scale that a region or a nation is affected. Quarantelli recognised this and proposed that emergencies, disasters and catastrophes were different and that the terminology should recognise different levels of effect on the community in order to better manage the response (Quarantelli 2000, 2006):

*"At the organizational level alone there are at least four differences:*

1. *In disasters compared to everyday emergencies, organizations have to quickly relate to far more and unfamiliar converging entities. One study of what was a major but nonetheless community-limited massive plant fire in Canada found that 348 organizations appeared on site. They included seven departments of local government, 10 regional government agencies, 25 entities from the provincial government and 27 organizations from the federal level, as well as 31 fire departments, 41 churches, hospitals and schools, four utilities, eight voluntary agencies, four emergent groups and also at least 52 different players from the private sector (Scanlon, 1991).*
2. *Adjustment has to be made (by agencies) to losing autonomy and freedom of action. Since community and crisis-time needs and values take precedence over everyday ones, all groups may be monitored and ordered about by social entities that may not even exist in routine times, or where the destruction of property is accepted to save lives in search and rescue efforts, or in the building of levees or firebreaks.*
3. *Different performance standards are applied. For example, the normal speed of response and individualized care given to treating the injured is superseded by a need to curtail the level of care given to victims as well as spending time, efforts and resources on more equitably distributing the many victims in the available medical facilities.*
4. *There is a much closer than usual public and private sector interface. The need for the quick mobilization of resources for overall community crisis purposes often leads to a preemption of everyday private rights and domains. This means that goods, equipment, personnel and facilities in the private sector are often without due process or normal organizational procedures requisitioned by public agencies for the common good. Everyone, be they individuals or groups, becomes subject to being taken over by governmental groups (Quarantelli 2006, p. 1)."*

Little discussion has arisen from Quarantelli's classifications, which he attributes to general acceptance of the differences between the three types he proposed (Quarantelli 2006). While Rautela (2006) has argued for the management of accidents as disasters, he does not dispute the classifications put forward by Quarantelli. Shaluf et al (2003) discuss the difference between crisis and disaster, but their review accepts the differences between organisational basis for crisis and the physical nature of disaster implicit in discussion in disaster management (Coppola 2007; Drabek 1986; Haddow & Bullock 2006; Haddow & Haddow 2009; McEntire 2007; Quarantelli 1986, 1988a).

#### 1.7.1.2. Disaster definitions from a social action perspective

If a social system describes the interaction of people in an identifiable pattern over a period of time (Barton 1970), then any study of human interaction relating to an emergency, and the channels and messages used by people and organisations, should be founded on a definition of disaster that recognises complex interaction and existing networks.

Carr (1932, p. 207) regarded disaster as a type of social change, developing a pathology of social reaction to disaster that was based on the typical sequence pattern for social change. He included a collapse of cultural protections to be one of the results of a disaster. An extension of this social change perspective was put forward by Barton (1970) who considered disasters to be components of 'collective stress situations', which occur when "...many members of a social system fail to receive expected conditions of life from the system." Both definitions focused on disasters as events that can have an effect on the usual social systems and neither distinguished between the event and its consequences – was the disaster the tornado, or the swath of destruction left in its wake? Dombrowsky agreed with Carr and added that disasters do not cause effects - it is the effects of the event that we tend to call disaster (1998, p. 21), not the event itself. Quarantelli assumes this "community impacting" definition as the outcome of 35 years disaster research (Quarantelli 1988d)

Lagadec (cited in Gilbert 1998) even described a disaster as a disorder triggered by communication problems. Gilbert discussed the event impact versus system breakdown definitions of disaster from three different paradigms presented by past writers: the patterns of war approach with disaster response a united effort against an outside threat or agent (1998, pp. 12-3); the disaster as social vulnerability approach (supported by Cutter 2005), in which "…disaster is no longer experienced as a reaction" but an action, result and social consequence (pp. 14-6); and disaster as uncertainty, which sees disaster

as crises, with roots in a serious disorder triggered by communication breakdown (pp. 16-7). This highlighted the effect of lack of quality information and referred to the proliferation of rumour and poor information that arises in the community's search for meaning from its circumstances (Gilbert 1998).

A further distillation of these categories of definitions was presented by Porforiev (1998), who sorted them into the "conceptual dimensions" of causal, descriptive and normative, but needing additional "axes" (1998, p. 59). He preferred definitions that allowed dynamism rather than a focus on a fixed event, and was more interested in the social scientists' approach that a disaster might increase a community's vulnerability to some sort of impact than the (primarily) geographer's view that a disaster is the reason for social disruption in a social system (1998, p. 59).

Disasters as "non routine events in societies or their larger subsystems" was a concept presented by Kreps (1998, p. 34) , who was one of the few sociologists to provide measurement of this impact in order to classify the event, but in the process is diverted from giving a definition that distinguishes, for example, between a bushfire and a car accident. In an earlier definition, drawn heavily from Fritz's 1961 book (Kreps 1984), Kreps develops a definition centred heavily on social structures and relationships between social units, where the causes and consequences of events are related to the way these social units are structured and interact. However, if a social system describes the interaction of people in an identifiable pattern over a period of time (Barton 1970), then any study of human interaction relating to an emergency, and the channels and messages used by people and organisations, should be founded on a definition of disaster that recognises complex interaction and existing networks and the physical situation. The United Nations' International Strategy for Disaster Reduction (2004) is the definition provided by an agency that comes closest to providing the causal, descriptive and normative approach mentioned by Porforiev:

> *A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources.*

The ability to distinguish between different types of disasters, but at the same time to consider social vulnerability, makes Porfiriev's definition (1998, pp. 61-2) useful to this discussion. His description is also pertinent because of its particular reference to the importance of communication to the functioning of social units and the implications if communication is disrupted:

> *"...a state/condition destabilizing the social system that manifests itself in a malfunctioning or disruption of connections and communications between its elements or social units (communities, social groups, and individuals); partial or total destruction/demolition; physical and psychological overloads suffered by some of these elements; thus making it necessary to take extraordinary or emergency counter-measures to re-establish stability."*

This definition is as applicable to the more insidious disasters such as drought or pandemic as it is to an earthquake or cyclone. It is also most applicable to this thesis, because the research will focus on community information seeking within a natural disaster and will incorporate the concept of networks as part of a functioning community, with communication featuring within these networks.

### *1.7.2. Phases of disaster*

The identification of phases of a disaster has been an important first step for emergency planners since Carr (1932) proposed his sequence-pattern of disasters based on the social change wrought by each phase of the disaster (Neal 1997). Sequencing disasters is said to have allowed emergency planners to ensure that all phases of a disaster have been covered, to assist people responsible for decisions about communities and disasters and to educate the community (Ellis, Kanowski & Whelan 2004; McEntire et al. 2002). Kelly (1998, p. 25) maintains there are four reasons for working to a disaster process model:

- it can simplify complex events, particularly "..helping to distinguish between critical elements and noise";
- using a model can lead to better understanding of a current situation and its evolution;
- it provides a base for measurement; and
- it provides a common base of understanding for those involved and helps to eliminate problems created by differences in language and culture around disaster management.

Vanderford et al. (2007, p. 17) discovered the importance of messaging according to different phases and even changing messages at certain stages of a phase during the Centers for Disease Control's response to Hurricane Katrina in 2005. Some texts on emergency management, (Haddow & Bullock 2006; Haddow & Haddow 2009), describe different communication strategies for some phases, such as public education in the pre-disaster phases and information delivery models for post-disaster phases. Haddow and

Haddow (2009, p. xvii) maintain that communication is "core" to all phases of a disaster (pp. xvii, 1).

This thesis will collect, sort and analyse data relating to how the community receives information during a natural disaster in order to identify a model to describe such behaviour. Because communication, in the information sharing/exchange interpretation of the word, is critical to disaster management from the first steps of preparedness to full recovery after a disasters, it is important to define the period or stage of the disaster to be studied here.

There are two different types of disaster models: those used by agencies around the world in response to the demands of disaster (prevention/mitigation, preparation, response and recovery, or PPRR); and those used by social scientists to explain the community's view of a disaster. A number has been proposed by researchers since Carr's first attempt in 1932.

A community-oriented description of the process of disaster has identified the following phases:

1. Pre-disaster period, in which the community goes about its daily business (Barton 1970; Carr 1932; Dynes 1970; Powell 1954; Stoddard 1968; Turner 1976);
2. Detection of the threat and the communication of warnings (Barton 1970; Dynes 1970; Powell 1954; Richardson 1994; Stoddard 1968);
3. Apprehension phase – a state of heightened awareness during the decision to evacuate or stay is made (Barton 1970; Powell 1954);
4. The dislocation phase on and after impact (and/or immediately beforehand in the case of slow moving threats such as bushfire or flood), toward the end of which the community takes an inventory and emerges into the next phase. During this phase, there is immediate response (unorganised), where individuals act on their own or in small, uncoordinated groups (Barton 1970; Carr 1932; Dynes 1970; Powell 1954; Stoddard 1968);
5. The reaction phase, which sees organised social response and rescue of other members of the community – groups become larger and social networks are re-emerging and can be drawn upon more readily (Barton 1970; Dynes 1970; Powell 1954; Stoddard 1968);
6. Remedy, when agencies join the response and recovery efforts, often at the same time (Barton 1970; Dynes 1970; Powell 1954); then
7. Completion of short, medium and long term stages of rehabilitation (Barton 1970; Carr 1932; Dynes 1970; Powell 1954; Stoddard 1968).

The period from the third phase, apprehension and heightened awareness, through to the through to the fifth phase, specifically the period of emergency agency involvement, will be used as the parameters for research into community information-seeking behaviour in the period of the highest impact of a disaster. These two phrases will be collectively known as the "impact phase" throughout the thesis.

### *1.7.3. Information behaviour*

**Information seeking behaviour/information behaviour:** this encompasses all of the information gathering behaviours, whether they are unintentional or purposive (Case 2008) and includes actively avoiding information. In this definition, all aspects of information are included – communication with others, drawing on media in some form, and the surrounding environment. 'Information' was described by psychologist George Miller as any stimuli we recognise in our environment (Case 2008, pp. 40). Wilson's (2000, p. 4) definition of human information behaviour is "the totality of human behaviour in relation to sources and forms of information, including both active and passive information seeking and information use."

**Information seeking:** "...a subset of information behavior that includes purposive seeking of information in relation to a goal" (Spink & Cole 2005, pp. 25).

**Information seeking pathway:** "…a serial chain of sources that continues until the seeker is satisfied or exhausted" (Case 2008, pp. 40).

### *1.7.4. Sources, channels and forms of information*

**Information source:** a medium in which knowledge/information is stored or the originator of a message (Rogers 1995) (for instance, a news reader, an agency representative, a friend).

**Information channel or form:** a means by which information is moved from one point to another, usually from the source to the receiver (Rogers 1995) (such as face-to-face, social media, newspaper or radio station, the internet). In this case, the term "form" will be used in preference to channel because it is the preferred term in other research that investigates reactions and information seeking by individuals in a crisis (Austin, Fisher Liu & Jin 2012; Liu, Jin & Austin 2013). This research was relevant to the research conducted in this study as the model it was based on attempted to explain how people sought information in a crisis.

## 1.8. Delimitations of scope and key assumptions, and their justifications

The disaster phase considered in this research was the main delimiter. Because activities undertaken by individuals, communities and agencies are very different in each phase of a disaster (Barton 1970; Carr 1932), it was decided to reduce the scope of this research to the period covered by the warning, apprehension, dislocation and inventory stages to fit into the requirements of a time-limited PhD project.

In addition, physical limitations resulted in the research being confined to Australian communities and disasters more prevalent to Australia such as flooding, bushfire and cyclone. However, the findings may apply and the model used in other western countries with similar technology and media landscapes to that available in Australia. Even if this is not the case, the study provides a valuable alternative to the predominantly North American cultural perspective of disaster behaviour (Quarantelli 1997).

## 1.9. Thesis style considerations

This thesis was written using the conventions of style and referencing established in Style Manual for Authors, Editors and Printers (Australian Government Printing Service 2002). It uses English (Australian) spelling throughout. Harvard AGPS referencing is used.

## 1.10. Summary of the introduction

This section provided an overview of this study into how people get information in a disaster. It explained the structure of the thesis, the approach to be used, the context of the problem being examined, and the research questions. It also provided definitions that could need clarification for the reader during the coming chapters.

The next chapter, Chapter 2, will review the literature from disaster sociology, focusing on disaster behaviour and disaster information seeking behaviour. It will also briefly consider information seeking thought. Chapter 2 will explain the search for a suitable model on which to base the research.

# 2. Literature review

In Chapter 1, the research problem and the parent fields that guide this research were introduced. Key terms were explored, and a summary of the methodology used for this project provided. It set the stage for consideration in this chapter, Chapter 2, of the key domains that inform information seeking behaviour in a disaster. It defined information seeking as a subset of information behavior that includes purposive seeking of information in relation to a goal, and disaster as an event that disrupts communication and social networks and results in physical damage that overwhelms local agency capabilities. Chapter 1 also provided definitions for key concepts, including disaster and information seeking, and defined the phases of disaster to be considered in this research.

Chapter 2 introduces literature from a number of fields that inform this study, focusing on two parent fields, information seeking and disaster sociology. It starts by exploring disaster behaviour and how the activity of information seeking is incorporated into human behaviour in a disaster situation. It then investigates information seeking thought, including every-day life information seeking and problem-specific information seeking. The literature reviewed for this study touches on an array of other fields, including experimental and behavioural psychology, gender studies, crisis and disaster communication by organisations, and informatics, and while the contribution of each of these fields of thought is acknowledged, the focus will remain on understanding what people do rather than cognitive processes and reasons for their action. Throughout this chapter, a pattern will be identified that moves the reader from a view of the individual through to establishment of a systemic approach to understanding information seeking in a disaster. The characteristics of the individual information seeking process will be used to build this systemic picture of the information seeking activity. The final section of the literature review will provide a framework for disaster information seeking developed from a model of problem-specific information seeking. A map of the chapter is provided in Figure 2.1. This map will be used throughout the chapter to keep the reader oriented in what can be, in places, a complex discussion.

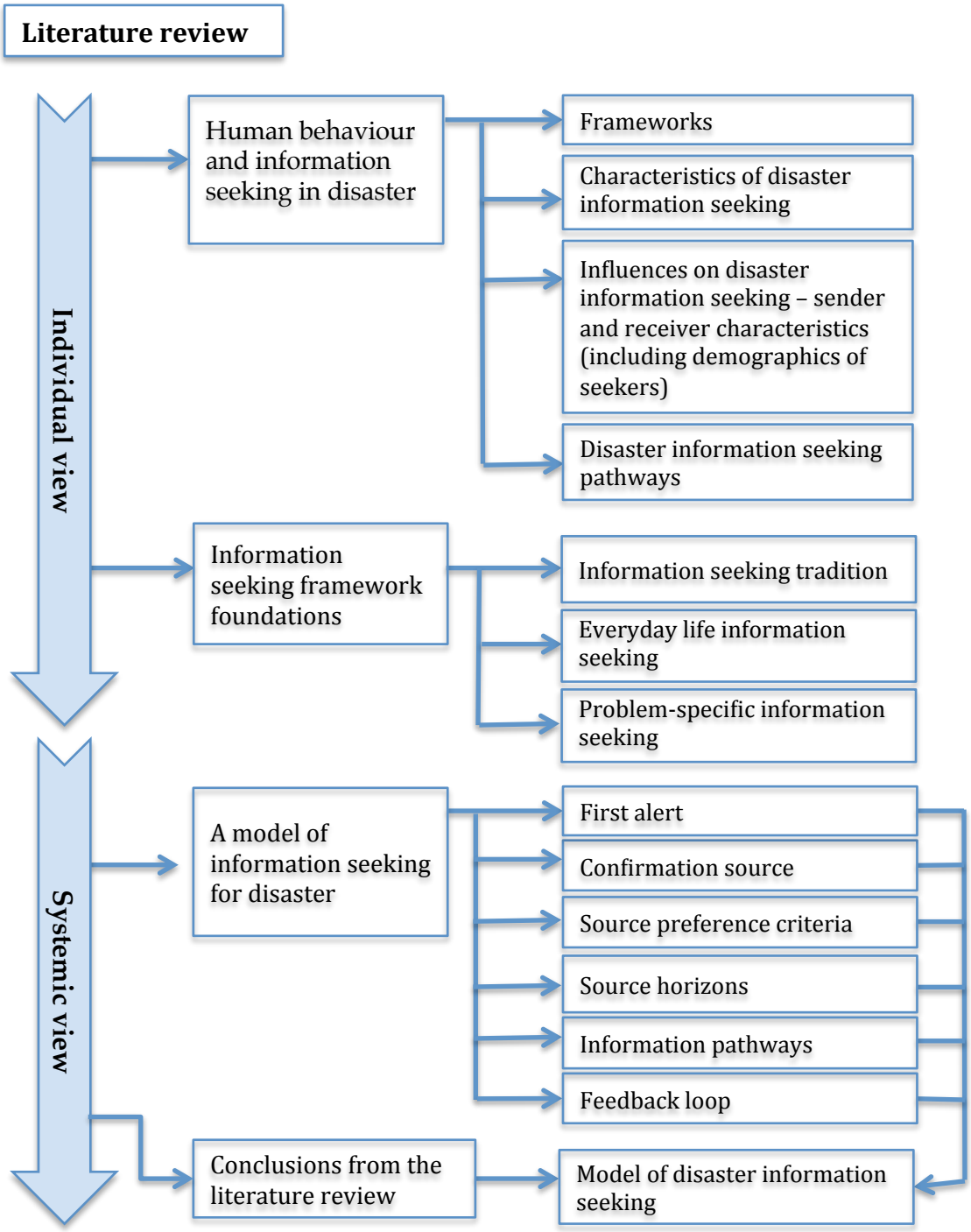



**Figure 2.1 A map of Chapter 2 - literature review**

## 2.1. Human behaviour and information seeking in disaster

This section is Stage 1 of the literature review and will consider the disaster literature to establish disaster behaviour and information seeking patterns in a disaster. It is necessary to understand the behaviour of people in a disaster zone to determine the role of information seeking in this behaviour. Understanding human behaviour and social systems during and after a disaster is stressed by Manoj and Hubenko-Baker (2007) as

critical in communication system design and therefore important to this study. The model of warning response presented by Mileti and colleagues (1995, 1999; 1992; 2000; 1990) was one such attempt to understand human behaviour during disaster and the protective action decision-making model (PADM) (Lindell & Perry 2012)was a second. The Mileti group's risk communication model for natural hazards attempted to generalise a task-oriented decision-making model based on information receipt and the perceptions of individuals receiving the information. Lindell and Perry's PADM model, however, attempted to explain the decision-making that emerged as a consequence of information received during a disaster. It is the task-orientation of the Mileti group's model that makes it suitable for this study, as this model was considered to have the potential to explain the behaviour that enabled decisions to be made, while the PADM model could be used during the next step, which would be to explain decision-making arising from and resulting in, certain behaviour in a disaster.

Mileti and O'Brien (1992) described a behavioural process common when a disaster approaches or has occurred:

1. Receiving an alert;
2. Believing the alert is credible/confirming the threat;
3. Personalising the threat;
4. Determining whether protective action is needed;
5. Determining whether protective action is feasible; and
6. Deciding what action to take and taking action.

Firstly, a person receives a message about an imminent or occurring disaster either from one or more environmental cues or from another person, whether this be someone they know or someone they see or hear via media. People then attempt to confirm what they have been told, by a visual check, mainstream media or contacting another person in some way (Mileti & O'Brien 1992). From the added information received in the confirmation stage, they process a meaning for what they have just heard or seen which then enables them to make a determination regarding the accuracy of the information and that it is relevant to them (or not). Belief that the warning is serious is a significant obstacle to individuals taking action, particularly if the conditions are similar to other incidents in the past that had not developed into a disaster (Eisenman et al. 2007). In fact, denial after first hearing about an approaching disaster has been a common reaction (Fischer III 1996; Fischer III et al. 1995). Drabek (2001) confirmed that threat denial was one initial reaction in the warning phase, but while all his study's respondents sought confirmation, social status influenced the sources of this confirmatory information. This is

the personalisation phase of the process (Mileti & O'Brien 1992). The fifth stage is that if the person decides the disaster is relevant to them, they decide what to do and then they act. It is a looped process that can be repeated as new information is received that changes the personalisation perspective for the individual (Mileti & O'Brien 1992). The sequence is not the same for everyone: some people may bypass one stage or more, and different people spend different amounts of time on each stage, as each stage can be affected by the characteristics of the individuals involved (Mileti & Fitzpatrick 1992). Within this framework, Mileti, Sorensen, Fitzpatrick and O'Brien (1995; 1992; 1992; 1990) proposed that once people have received notice of a disaster, they enter a communication activity to define the situation by confirming the contents of the message through another source, sometimes neighbours, friends, family or other media, with some researchers including the internet (Crowe 2010; Fitzpatrick & Mileti 1994; Fritz 1961; Kreps 1984, p. 320; Leik et al. 1981).

Mileti and O'Brien (1992) were interested in the effect of characteristics of the sender and the receiver on the decision making that individuals undertook in the natural hazards communication process. For the sender, these characteristics included features of the message (specificity, consistency, certainty, accuracy, clarity and frequency), the medium (certainty, frequency, channel) and the process the sender employed. Mileti (1995) later added 'sufficient information', split specificity into 'guidance' and 'risk location information', and dropped 'process ' from the list of attributes.

For the receiver, the characteristics included background factors such as networks, resources, demographics, activity, knowledge, cognition, experience, and distance from the disaster (Mileti & Fitzpatrick 1992, pp. 394-5). Mileti (1995) later amended these to environmental cues, social setting (which seemed to include activity at the time and where family were), social ties (networks), socio-demographic characteristics (which incorporated the older model's resources and demographics factors), psychological characteristics, and pre-warning perceptions (incorporating experience and knowledge). The receiver characteristics were classified into three groups: 1) environment; 2) social attributes; and 3) psychological characteristics. Environment incorporates physical and social cues such as seeing the smoke or rain when flood warnings are received, or seeing neighbours evacuate. Social attributes include networks of social and familial ties that include friend, family and neighbours. The social attributes cluster includes characteristics of physical and economic resources, and demographics factors. The third group, psychological characteristics, includes information that the individual has collected previously on the hazard and protective action; factors such as psychosocial stress levels

and locus of control; and experience with the hazard and the recency of that experience (Mileti & Fitzpatrick 1992).

The sender characteristics that Mileti and Fitzpatrick (Mileti & Fitzpatrick 1992) put forward related to message and the form used to deliver the message. Individuals were more likely to take action if the messages contained specific instructions and details about what was happening, were communicated over multiple channels, sent out with high frequency, from trusted official sources and then confirmed by other sources. In addition, the channels used by the community to receive disaster warnings and information must guide the selection by agencies of channels used to send the message.

Their resulting model of public perception and response to communication about natural hazards is presented below in Figure 2.2.

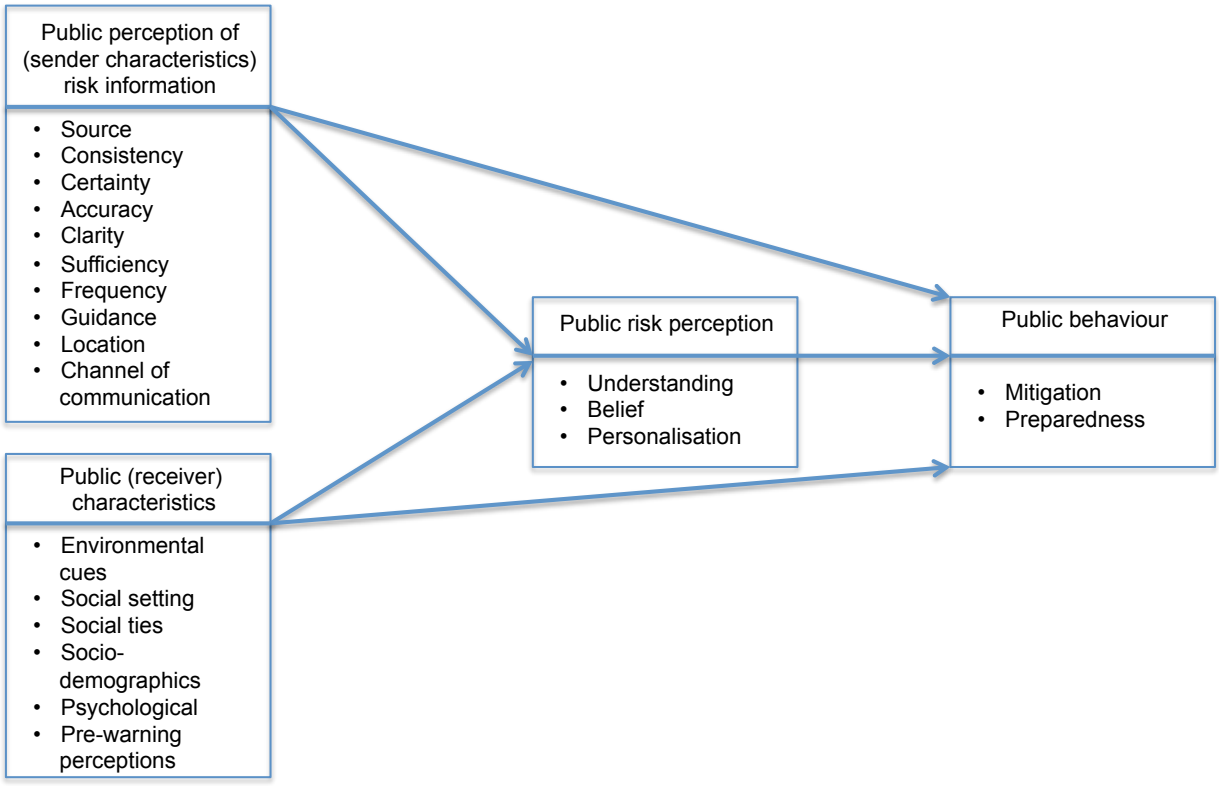



**Figure 2.2** **A theoretical synthesis of conclusions from prior research on risk communication for natural hazards developed by Mileti, Sorensen, O'Brien and Fitzpatrick (Mileti & Fitzpatrick 1992; Mileti & O'Brien 1992; Mileti & Sorensen 1990).**

The risk communication for natural hazards model describes influences on information during the disaster behaviour process of 'hear – confirm – understand – believe –

personalize – respond'. On hearing that a disaster may be a threat, individuals will confirm the threat. For instance, looking outside and using other sensory cues, calling someone and seeking information in some other way was primary behaviour for many tornado survivors even before seeking shelter (Chaney & Weaver 2008). In areas where communities are experienced with the hazard and how to react because of the hazard's regularity (tornadoes in central United States, bushfires in California and Victoria, flooding in Bangladesh, cyclones in the tropics), this confirmation period may be bypassed. At the opposite end of the scale, where a threat is completely unexpected and outside the individual's experience and understanding (such as the World Trade Center disaster in 2001), the confirmation period takes some time as sensemaking occurs (Ripley 2009). The confirmatory behaviour seems to occur at both warning (Drabek 2001; Mackie, McLennan & Wright 2013) and impact stages of a disaster, which is pertinent to this thesis, as the impact phase will be the focus (see Chapter 1). Greenberg et al. (2002) studied the amount of interpersonal interaction during the confirmation stage amongst survivors of the destruction of the World Trade Center and the attack on the Pentagon on September 11, 2001, and found it was positively related to levels of anxiety within this stage of the behaviour cycle. This might be connected to the level of disbelief, which, anecdotally, seemed so high during the 9/11 aftermath that the confirmation stage was prolonged even though the disaster had already occurred. Drabek (2001, p. 92) confirmed that threat denial was one initial reaction in the warning phase. This points to the possibility that information seeking is not always an automatic reaction to a disaster alert. An alert could lead to any activity between one extreme of extended confirmation behaviour to the other extreme of no confirmation behaviour at all.

During and on completion of the confirmation stage, individuals attach meanings to the warning they received influenced by the range of factors shown in Figure 2.2. From these meanings they achieve an understanding, then a belief, about the scale of the threat, and therefore an understanding of how it will affect themselves and their close friends, family and neighbours. The level of personalisation involves determining whether protective action is needed, whether it is feasible, what to do, and then doing it (Mileti 1999). "A person typically goes through the stages of the model each time a new warning or risk information is received" (Mileti & O'Brien 1992, p. 41), thereby continuing the process until the threat has diminished or the personalisation factor removed.

The Mileti disaster behaviour process has been confirmed by a number of studies, including Blake et al. (2004), who explored human activity during the Word Trade Center bombing of 2001. The results were based on 3,291 experiences reported in the media from

260 World Trade Center survivors. They found that there were seven types of behaviour in reaction to the planes hitting the towers:

1. Confront the hazard, such as collect a fire extinguisher;
2. Seek temporary refuge, such as hide under a desk;
3. Gather/provide information such as look out the window or speak to a colleague;
4. Receive/provide assistance, such as rescue a trapped colleague;
5. Prepare for the physical act of escape, such as collect belongings; and
6. Do nothing at all, such as continue with work; or
7. Extreme behaviour, such as panic.

The first, second, third, fourth and last actions of each survivor were measured (Blake et al. 2004), and 'gather/provide information' was the most prevalent of the first (62%), second (48%) and third (61%) actions of a survivor and 'prepare for evacuation' was the most prevalent fourth action (54%) and last action (68%). Extreme behaviour was noted in 0.8% of cases, or one person from the sample. However, while most of the reports used by the study were published only days after the event, this study did not collect firsthand information and was not able to ask the same questions of all survivors. Also reviewing media articles on 9/11, but through the lens of Emergent Norm Theory, Connell (2001) confirmed this interpretation of World Trade Center evacuee behaviour, with the Emergent Norm Theory concepts of milling and keynoting reflecting Blake et al.'s (2004) first, second and third steps. A disadvantage of both studies was the inability to link variables such as age and education to certain activities, with no demographic data on the respondents available because of the methodology used.

One problem with Blake et al.'s (2004) model is that, as a behavioural model it does not account for the first alert, the step by which a person becomes aware of the disaster. This could affect the type of behaviour that Blake identified in his first step, confronting the hazard. For example, if a person first became aware of a fire because smoke was evident, then collecting a fire extinguisher would be one way to confront the hazard. Connell (2001) discussed sensory cues as an important part of behaviour in a disaster, and his study also identified the importance of other people in notification of a disaster – specifically floor wardens and emergency personnel in the World Trade Center in 2001.

### *2.1.1. Characteristics of disaster information seeking*

This section discusses the first alert, and then where people next turned for information to either confirm or refute this first alert. It also looks at which sources became most important during the disaster. Studies that look at how people received information tend

not to structure their findings in terms of first alert, confirmation source and key sources, but instead look at first alert and the most often used or most valuable source. After the alert to the imminence of a disaster, Mileti and O'Brien's risk communication for natural hazards model (1992) showed a confirmatory sequence of behaviour – confirming that the threat was real, personalising the threat, considering whether action was feasible and what action to take, and then taking action. Each of the steps before "taking action" incorporated a number of cognitive activities that were fed by more information, with this information either absorbed via physical senses or secured from other sources of information. Often one source is more reliable with its information or is updated more regularly and will become the most valuable (or main) source of information. All three aspects of information seeking – the first alert, the confirmation source and the main source – will be discussed in this section.

#### 2.1.1.1. The first alert

The first alert that the disaster is imminent or has arrived is important to consider because it is the trigger for the established behavioural process described in Section 2.1 (Mileti 1999; Mileti & Peek 2000): the person needs to believe that the warning is credible, confirm the event is a threat, personalise the threat, determine whether protective action is needed and then whether it is feasible, and decide what action to take, then take it. This process of making sense of the situation is often punctuated by further information seeking that contributes to the sensemaking activity and helps the individual personalise the threat.

The source and form of a first alert of an incident of community-wide importance is influenced by a number of factors (Ruggerio & Glascock 2002, p. 66), including the time of day and therefore the person's location (school, work, home, in transit), own communication networks and the strength of relationships within these, and what occurs during the incident in terms of access to information sources (such as a power outage). These will be considered later in the chapter.

In Australia, the greatest body of research on human behaviour relates to bushfire with a number of studies investigating community behaviour before, during and after bushfires and incorporating questions about information seeking and behaviour (Boylan, Cheek & Skinner 2013; Mackie, McLennan & Wright 2013; McLennan 2014; McLennan, Elliott & Omodei 2012). In the January 2013 NSW bushfires, seeing the smoke was the key alert source across three affected communities (Mackie, McLennan & Wright 2013). Similar results were discovered in a study of the Tasmania 2013 fires, where the largest number of respondents (42%) were alerted to a fire by environmental cues (Boylan, Cheek & Skinner

2013) and at Parkerville in Western Australia in 2012, where 75% of respondents were alerted by environmental cues (McLennan 2014). Similarly, environmental cues were the key alert source in South Australia in 2015 (Every et al. 2015) and across three sites in 2014 (Trigg et al. 2015). In the WA study and one community in the NSW study, residents reported that an official alert message was the second most likely alert source (Mackie, McLennan & Wright 2013; McLennan 2014). However, respondents from the two other NSW communities (Mackie, McLennan & Wright 2013) as well as Sampson Flat in South Australia (Every et al. 2015) reported that other people were the second most likely alert source. Also in Tasmania, other people were a key alert source after environmental cues, with almost 21.6% of respondents reporting that this was how they learned about the bushfire (Boylan, Cheek & Skinner 2013). However, when it came to warning preferences, respondents across all three NSW communities preferred to be warned by agency text message or message to a landline (Mackie, McLennan & Wright 2013), while the Tasmania study respondents wanted to be alerted by mobile phone text message or a radio announcement (Boylan, Cheek & Skinner 2013). Social media use was tested in the Sampson Flat study (Every et al. 2015), which asked what people did when they found out the fire was in their area. This question recorded information seeking and protective action. Most people's information seeking behaviour consisted of contacting friends, family and neighbours (83.5%), turning on the television for more information (72.0%), turning on the radio for information (52.4%) and going on Facebook (45.2%). This is the most substantial use of Facebook as a share of the total information seeking activity to be found in the literature and could be explained by a sample skew toward women, but not explained by a sample skew toward older people. Twitter was not widely used: 7.3% of the survey sample went onto Twitter when they realised the fire threatened their community (Every et al. 2015).

Tornadoes are among the most often studied disasters, and researchers of this type of disaster consistently ask questions about first alerts and, sometimes, about the confirmation source and form. People first heard about local tornadoes from other people in their social network (Donner, Rodriguez & Diaz 2007) – neighbours, friends or family – but these sources and forms passed on official warnings (2007; Eisenman et al. 2007). In the Joplin, Missouri tornado in 2011, 72.9% of those responding to a survey learned about the tornado via a siren (National Weather Service Central Region 2011; Paul & Stimers 2011), from which they turned to television to learn what type of disaster they were facing. In the Super Tuesday tornados around Lafayette, Tennessee in 2008, people were waiting for any official warning of a tornado in their neighbourhood via television, but tornadoes took out the power and there seemed to be no backup plan for most residents (Chaney & Weaver 2008). Local television stations were the most common source of initial

alert for the Lafayette residents, with 78% reporting this media as their first alert (Chaney & Weaver 2008) and 75% of Moore residents in 2003 (Comstock & Mallonee 2005). Television was also first source for 85% of residents in the area of the 1998 Oak Grove-Birmingham tornado (Legates & Biddle 1999). In incidents that covered a small geographic area, sirens and loudspeakers were the first source of information for some (Hayward et al. 2010) and are often referred to in studies of tornado affected communities as the first indication of an approaching disaster, often very close to or just on impact (Comstock & Mallonee 2005; Donner, Rodriguez & Diaz 2007; Leik et al. 1981; National Weather Service Central Region 2011). In the 1998 Oak Grove – Birmingham tornado, a tornado siren was the first source for 18% of people in one of the sectors studied, second to television (Legates & Biddle 1999) and at Moore, 77.6% of people were alerted by siren, followed by television (Comstock & Mallonee 2005). In research on the 2011 Joplin, Missouri, tornado, respondents expected to hear about the disaster via a siren (Paul & Stimers 2011, p. 16). The Moore survey by Comstock and Mallonee (2005) was one of very few to ask which medium or message prompted people to take protective action – almost 60% of those reporting on the 2003 storm said television prompted them to seek shelter.

The preferred alert form in a hypothetical flash flood in Denver, Colorado and Austin, Texas showed mixed results (Hayden et al. 2007). Relating to first hearing about a flash flood from official sources, Denver respondents preferred a siren at each of the three times of day tested in the study, while Austin interviewees preferred sirens at 2.30 am, local radio at 11 am and local television at 3 pm, which were the times presented in the survey. Researchers concluded that the differences could be attributed to age, education and ethnicity and suggested that site specific research may be necessary for emergency managers to better understand their own communities' information seeking behaviour and needs (Renn & Levine 1991).

In a storm, local free-to-air television was the most popular form for Californians surveyed about a storm that occurred 5-6 January 2008, with 50% of people using television leading up to the storm, and 49% using television during the storm (Drobot, Schmidt & Demuth 2008). The next most important form was cable television with 10% and 9% identifying it as most used leading up to and during the storm. This study was flawed in terms of its representedness probably as a result of the online collection method – 30% of the participants were male, and participants were predominantly well educated (almost 90% had a college or associate degree or higher). However, the results reflected those gathered after a terrorist attack (Greenberg, Hofschire & Lachlan 2002).

'Other people' featured highly as a first alert or main source, especially in disasters that were high impact or more urgent (Drabek 1999 p. 518). The receipt of warnings has been described as a catalyst for debate about how to react because "… most of the time, most people are with someone else. So it is groups, not individuals, that actually process most disaster warnings" (Drabek 1999, p. 518). This may also apply in the impact phase. It was well demonstrated during the Virginia Tech massacre in 2007, with many people who shared and sought information online later in the day, describing their first alert as coming from friends or family via mobile phone or web-based platforms such as email or social media (Palen et al. 2009). This group focus in the alert phase was also shown in research after Hurricane Katrina, during which the first alert for many people came from interpersonal sources (15%), a combination of interpersonal sources and media (27%) and media (47%) (Taylor, K. et al. 2009). Fifty percent of respondents from the greater Lansing area of Michigan to interviews in the days after the 9/11 events heard about the events from others and 33% from television (Greenberg, Hofschire & Lachlan 2002, p.8). This correlates with substantial numbers of human information behaviour studies that show that people consistently choose other people as important or preferred sources of information (Case 2008; Johnson et al. 2006).

Research on behaviour during and after the World Trade Center attacks in New York in 2001 showed that 49% of respondents discovered the event via television, while 21% found out from friends and co-workers (Stempel III & Hargrove 2002). This was supported in other studies (Bracken et al. 2005; Jones & Rainie 2002, p. 32). The demographics of the respondents for each of these studies were similar and somewhat representative of the national population, allowing solid conclusions to be made about information seeking behaviour in this instance. A German study (Roeser & Schaefer 2002) of young people produced similar results even though the time of day was quite different (2.45 pm in Germany compared with 8.45 am in New York).

Contrasting with the United States experience of first hearing from others, was that of Puerto Rican respondents to a Hurricane George study (Perez-Lugo 2004) that asked questions on information sources during the impact phase in 1998. In this research, 100% of the 37 interviewees reported that they first heard about the hurricane through the media. After the Boxing Day Tsunami in 2004, 79.3% of Mauritians learned about the wave on free-to-air television (51.7%) or radio (27.6%) (Perry 2007). Face-to-face contact was a minor form of alert, with only 15.4% of people in this case reporting that they learned of the disaster this way. When measured at time increments through the day, television and radio were comparable in terms of their status as an alert source, until 7-8 pm on the day of the tsunami, and at this point, television became more prevalent as the

alert source (Perry 2007). These differences at different times certainly influenced the way people in the neighbourhood of a major fire in Ephrata, Pennsylvania in 1990 received the news (Fischer III et al. 1995). The fire occurred just after midnight when most residents were in bed asleep – 37% discovered the fire by hearing emergency agency activity or becoming aware of it in some other physical way, 22% were alerted by a family member, 11% by a neighbor, 24% by emergency personnel and only 6% alerted by the media to the fire.

It is interesting to compare the first sources of the 9/11 World Trade Center disaster with the 2007 Australian tsunami warning (King 2007), which occurred at similar times of day, in that period as people prepared for their day and arrived at work and school – 57% of the respondents to the King study reported being at home, 23% were at work and 15% were travelling when they first heard the warning. Twenty three percent of respondents in Cairns and Townsville heard the tsunami warning on commercial television, a further 30% from commercial radio and 5% from ABC radio, the government funded broadcaster. Forty per cent recalled that they heard via "word of mouth", while in a shop or business, at work or at school while delivering children. All of the respondents to King's research were located in urban areas. Other tsunami studies in American Samoa and Banda Aceh recorded the shaking of the earthquake (environmental cues combined with knowledge of the cause of tsunami) as the first warning of a potential tsunami (Gaillard et al. 2008; Lindell et al. 2015) as well as the activity of others in their social network (social cues).

#### 2.1.1.2. Confirmation source and/or form

Looking for information in order to confirm something already discovered was identified in the previous section as a key behaviour when people are in a disaster. Quarantelli (1990, p. 5) says it is "…almost inevitable that social interaction will occur…" to validate a received warning. This was particularly the case if those involved lived in an area that had not recently experienced a disaster, and residents found it difficult to adopt a new frame of reference without more information (Fritz 1961). The confirmation stage occurs each time a person receives new information and is a reason that telephone networks become busy after a warning (Fitzpatrick & Mileti 1994) and at other stages during a disaster as people call friends, neighbours and family to determine how they should interpret the information (Legates & Biddle 1999). Confirmation facilitates understanding, belief, personalisation and decision making that helps to fill an information void when rare or unexpected events are expected to occur (Fitzpatrick & Mileti 1994). "This void typically creates public demand for more information than is being disseminated in the warning message" (p. 74). Confirmation often involves discussion with others and

interpretation of information received via traditional media (Sharma, Patwardhan & Parthasarathy 2009; Taylor, K. et al. 2009), particularly when individuals feel there is a void in the information provided by official and media sources (Aguirre & Tierney). This interpretation stage by individuals was found after Hurricane Katrina to have been always a shared experienced and where the role of opinion leaders became important. "This leadership could come from someone within or outside of the family, but most commonly came from someone who contacted others individually, on an interpersonal basis, rather than a media or political figure seen on television" (Taylor, K. et al. 2009, p. 27).

The amount of information sought and the level of information seeking in this confirmation phase is determined by the individual's level of worry or uncertainty about the situation (Griffin et al. 2004; Lachlan, Westerman & Spence 2010), and it appears to account for apparently high levels of interpersonal contact after 9/11 (Greenberg, Hofschire & Lachlan 2002) and after a tornado (National Weather Service Central Region 2011). It can also be affected by demographic factors such as income and education, with those in the lowest income quartile, who also had the lowest level of education, spending more time on confirmatory information seeking before taking action (Phillips, Metz & Nieves 2005). Differences across communities in their selection of confirmation sources was evident in Australian bushfire studies (Mackie, McLennan & Wright 2013; Trigg et al. 2015). Residents of three NSW towns tended to use different channels and sources to make sense of what was happening during bushfires in 2013 (Mackie, McLennan & Wright 2013): respondents in the Shoalhaven area turned on their radios for more news once hearing about the fire, with other people and the Rural Fire Service websites also well-reported confirmation sources; the Yass community relied more on other people for confirmation, as well as the RFS website; and Coonabarabran participants mostly used other people as confirmation sources, with radio the second most reported confirmation source (Mackie, McLennan & Wright 2013). Trigg et al also found variations between communities in South Australia. While in Bangor and Eden Valley, most people confirmed using radio, in Rockleigh the Country Fire Service website was the most popular confirmation source (Trigg et al. 2015), possibly due to greater fire experience in this community.

Mass media use played an important part in tension reduction (Perse et al. 2002) after the 9/11 attacks and also the 2011 Joplin tornado (National Weather Service Central Region 2011), where visual confirmation was also important to a number of people. Confirmation behaviour may also incorporate the consultation of "significant others", people important to the individual and who have some influence over the individual's actions in preparing

for and coping with a disaster (McIvor & Paton 2007, p. 84; Taylor, K. et al. 2009). Even amongst those able to connect to the web during the disaster, a significant number of participants in online communities after Hurricane Katrina valued most highly information from others – 30% of an internet survey respondents (Procopio & Procopio 2007). In Hurricane Katrina, it was usually interpersonal communication that provided the catalyst for people to evacuate (Taylor, K. et al. 2009). Their conclusion was that "information isolation" may be a result of social isolation and that further research should be conducted to confirm or refute their results (Taylor, K. et al. 2009).

If the level of anxiety correlated with the level of information seeking and information available (Boyle et al. 2004; Wray & Jupka 2004), then the 2007 tsunami warning in Cairns and Townsville in Australia did not provoke much anxiety, with 31% of survey respondents (King 2007) not receiving further warning information and 70% stating they had no need for further information. Of the respondents who received further information, 17% reported they received it from television, 18% from radio, and 19% from other people (King 2007 p. 11). A further 3% reported that they had received further information from television and radio, but this additional category was not explained by the author. Of the 30% who needed more information and actively sought it, almost 59% used the Bureau of Meteorology website (King 2007, p. 13). The greater the level of uncertainty, the more people rely on trust in their sources to guide their quest for information about hazard mitigation (Paton 2007). This could lead to people who are experienced in disaster, for instance in bushfire, cyclone and tornado prone areas, to have an established relationship with agencies and therefore a tendency to cut the confirmation stage short by securing and taking action on agency information much more quickly than those not experienced and without an established relationship with agencies on a particular disaster.

#### 2.1.1.3. The main source and/or form

Most important or most valuable information sources have also been explored in disaster research. California wildfires research in the online population after the October 2007 disaster (Sutton, Palen & Shklovski 2008) showed that the rapidity of the disaster created a vacuum in which there was a "dearth" of information. Respondents reported that they sought information:

- through information portals and websites advertised in traditional media (76%);
- using mobile phones to contact others (54%);
- accessing alternative news sources and individual blogs (38%);
- discussion on various web forums (15%);

- from photo sharing websites such as Flickr or Picasa (10%); and
- from Twitter (just less than 10%).

Traditional media, particularly local outlets, was reported as an important form, but details were not given possibly because of the information communication technology focus of the research. The relatively large number of people using other people as a source of information was also reflected in the 2006 Australian Grampians bushfires reported by Cohen et al. (2007), where information from other people very close to the fire were used by many residents to piece together an overall picture. The other key form was local radio rather than state or national media, which was also an important source in the 2007 Southern Californian wildfires (Sutton, Palen & Shklovski 2008) because of its ability to be more relevant to local residents. The pattern of relying on other people and mainstream media was confirmed by a survey reviewing information seeking in five major US fires by Steelman, McCaffery, Velez and Briefel (Steelman et al. 2014), although newspapers and maps featured in the top five most important sources after other people in this study.

Other people as the main source was reported in incidents in which situational factors removed access to electricity and/or media, such as in Banda Aceh, Haiti and areas in Mauritius and Sri Lanka after the Boxing Day tsunami (Gupta 2013; Kurita et al. 2006; Perry 2007; Romo-Murphy, James & Adams 2011), Cloncurry after the 1997 flood (Goudie & King 1997) and many tornadoes and cyclones (National Weather Service Central Region 2011; Vachette & King 2011). Face-to-face communication with interpersonal sources was reported as the key source in experimental research by Austin, Liu and Jin (2012). In those places where power and telephones were not available, going to a place to get news from other people was the most common pattern of information seeking (Gupta 2013). While multiple methods were used by respondents in three communities for a study on the January 2013 New South Wales bushfires, the most popular sources were family and friends (Yass, 59% and Coonabarabran almost 40%) and local radio (Shoalhaven, 62%) (Mackie, McLennan & Wright 2013). The Coonabarabran community had fewer sources of information and this was reflected in the depth of information seeking recorded by Mackie, McLennan and Wright. The prevalence of other people and radio as main sources of bushfire information was supported by post-Black Saturday bushfire research in Victoria (McLennan, Elliott & Omodei 2012). This showed that while smoke, embers, flames and fire noise were the key information source, radio announcements by mostly ABC (Australian Broadcasting Corporation), neighbours and family on mobile phone, agency websites, and personal visits by neighbours and agencies made up the suite of main sources for people in the bushfire areas (Heath et al. 2011; McLennan, Elliott & Omodei 2012; Trigg et al. 2015).

Environmental cues remain a primary source of information during a bushfire along with and other people (McLennan et al. 2011; Trigg et al. 2015). Other studies did not include environmental cues in questions about sources of information during an incident (Heath et al. 2011).

Television and then radio were overall the most popular source of information during the warning and impact stages across a wide range of disasters and community types, followed by, in more recent studies, social media/internet (Greenberg, Hofschire & Lachlan 2002; Legates & Biddle 1999; Lindell, Lu & Prater 2005; National Weather Service Central Region 2011; Nogami & Yoshida 2014; Prater, Wenger & Grady 2000). Confirmation behaviour may also account for an increase in internet usage directly after 9/11, and it was well used by evacuated New Orleans residents after Hurricane Katrina with 55.7% of African Americans, 75.7% of Caucasians and 71.4% of non Whites using the web for post-evacuation information (Spence, Lachlan & Griffin 2007). Jones and Rainie (2002, p. 31) found that while 22% of internet users got news from the web before the attacks, 28% of internet users sought news information directly after the World Trade Center attacks, although most still reported learning about the disaster from electronic media. "For many online Americans, the internet played a useful supplemental role as a communications tool...and as a news source" (Jones & Rainie 2002, p.32). Canadians may rely on the internet significantly: along with television (39%) and radio (26%), their preference to receive information about an emergency was via social media updates by agencies including email (31%) (Ipsos Reid 2011). The Ipsos Reid study showed that expectations will drive increased use of the internet for information, with most of the online and telephone survey respondents believing that Red Cross in Canada should be prepared to respond to calls for help posted on social media (68%) and should be monitoring social media (67%), and that agencies such as police should be prepared to respond to calls for help posted on social media (66%) and should be monitoring social media (63%) (Ipsos Reid 2011). Social media was also a significant source of information for survey participants (32%) asked about the Great East Japan Disaster caused by an earthquake in 2011 (Nogami & Yoshida 2014), which was more than any other interpersonal source or form of information provided as a choice in the survey.

Many US studies also reveal television as the main source once people learn of a disaster in their area (Chaney & Weaver 2008; Drobot, Schmidt & Demuth 2008; Legates & Biddle 1999; National Weather Service Central Region 2011; Paul & Stimers 2011; Piotrowski & Armstrong 1998) across both urban and rural areas. However, talking to other people was the only information seeking activity undertaken by people who had just been through a

tornado in the National Opinion Research Center study of Arkansas in 1952 (Quarantelli 1988b), possibly because of the timing (during the night) and the lack of power. Quarantelli reported that word of mouth was the main source of information for tornado victims up to three weeks from impact.

Main sources of information seemed to differ according to the type of disaster, but people experiencing a hurricane or cyclone consistently relied most on local radio and television (King & Goudie 2006; Perez-Lugo 2004; Piotrowski & Armstrong 1998). Radio was the most prevalent source for the first warning of a cyclone, usually around 25 to 30%, followed by television 17-20%. Both of these might be included in the category multiple sources (usually around 22%) and radio and television (around 18%) of the research respondents (King & Goudie 2006). The Cyclone Larry March 2006 report in particular highlighted the fact that internet was not used widely, probably because less than one quarter of the surveyed population accessed the internet at any time before the cyclone developed (King & Goudie 2006). However, during Hurricane George, which hit Puerto Rico in 1998, weather websites, television and radio were preferred sources, and after the power went out, radio was most replied upon (Perez-Lugo 2004). For a disaster somewhat removed from respondents, such as the swine flu outbreak in Mexico in 2009, a survey of American respondents showed that most (69%) learned something about the outbreak from local television, but that the internet was the most useful source (Pew Research Center 2009). Television was the main source of information for those expecting a tornado (Chaney & Weaver 2008; Legates & Biddle 1999; Paul & Stimers 2011) and one study pointed to it being the main source for people expecting major winter storms in United States (Drobot, Schmidt & Demuth 2008).

Social media and the internet have turned information seeking in a disaster into a more complex process, with individuals both seeking and sharing information (Palen et al. 2009). Verification of information via social media during the Virginia Tech massacre was a legitimate process, as it became a forum for problem solving at a time when agencies were constrained by their own processes and ethics and therefore could not publish the information as quickly as it was needed by the community (Palen et al. 2009). The range of information forums that were generated that day proved to be self-regulating and contained information with surprising integrity, with lists of the dead published on the forums found to be never incorrect (Palen et al. 2009, p. 475). Crisis can also cause increased activation of social networks, with the internet a facilitator of the contact (Procopio & Procopio 2007). Of those able to get online during Hurricane Katrina, 59% reported activating family networks, social (79%), geographic (31%) and school-related (25%) networks. Both strong and weak ties were activated and survey respondents

reported that the impetus related to uncertainty reduction. At the time of writing in 2013, social media use was still growing and was not as accepted universally across populations as a source equivalent in value or accessibility as radio or television and this may be, along with accessibility problems, one of the reasons it was not well used before Hurricane Katrina in 2005 (Spence, Lachlan & Griffin 2007).

Use of the internet is an important source in information seeking behaviour, generally agency, news and weather websites. However, only one study revealed an agency website to be the main source of information for the largest number of people, which was McLennan's study of the 2012 Parkerville, Western Australia fires – 39% of respondents reported that the Department of Fire and Emergency Services website was an important information source, 11% regularly used the Australian Broadcasting Corporation's news website and 11% used the local shire's Facebook page(McLennan 2014). The other key source was other people (25%) (McLennan 2014). The study community was primarily urban and it could be assumed had reliable internet access.

#### 2.1.1.4. What people wanted to know

The type of information that people needed in a range of disasters has been touched on in a wide range of research. In Sri Lanka after the 2004 tsunami, hundreds of calls to a call centre were received, with people in the recovery phase mainly seeking information on housing and livelihoods (Wall & Robinson 2008).

Residents in a number of Australian bushfire studies reported that information was too general, preventing them to make informed decisions and from taking decisive action (Boylan, Cheek & Skinner 2013; Mackie, McLennan & Wright 2013). Location of a bushfire is a primary requirement, and the speed of the burn and wind direction also important (Boylan, Cheek & Skinner 2013). Uncertainty about evacuation routes was a key concern (Boylan, Cheek & Skinner 2013; Mackie, McLennan & Wright 2013). In South Australia in 2015, a survey of 308 people from a fire-affected community near Adelaide, while most were happy with the information provided, identified a range of information they had looked for during the incident (Every et al. 2015). Where to evacuate to, whether they could take their pets, and when they could return home; where the fire was – it was named the Sampson Flat fire, but not everyone was familiar with where this was; and maps and mention of street names to show where the fire was (Every et al. 2015) .

#### 2.1.1.5. An overview of the characteristics of disaster information seeking

Mileti and colleagues' proposal that that receipt of information is a key component of reactions by individuals to the approach or arrival of a disaster is supported by research from around the world. It also shows that information seeking is critical to decision-making in a disaster. From the studies reviewed for this section, it is also evident that there are differences in information seeking behaviour between types of disasters (Chaney & Weaver 2008; Drobot, Schmidt & Demuth 2008; King 2006; Legates & Biddle 1999; Paul & Stimers 2011; Perez-Lugo 2004; Pew Research Center 2009; Piotrowski & Armstrong 1998). A range of other influences affect disaster behaviour (Mileti & Fitzpatrick 1992), and therefore may have influence on disaster information seeking – this will be explored in further detail later in this chapter.

The literature has revealed the following key points:

- the model developed by Mileti, Sorensen, Fitzpatrick and O'Brien and subsequent research shows that information plays a large role in disaster decision making;
- people will learn of an approaching tornado via the local siren, messages from friends or neighbours, or television;
- an alert to flooding, hurricane/cyclone or tsunami will come to a community via television or radio;
- people involved in a bushfire will rely on local radio and their friends, family and neighbours for more information;
- if the disaster is sudden, such as a bushfire or terrorist or shooting attack, other people (workmates, family, neighbours) will be the source of the first alert;
- people will not always seek more information after receiving the first alert;
- the confirmation stage can be extended or nonexistent, depending on the circumstances of the individual;
- television is the most relied-upon source in United States for a range of disasters, although other people and news and weather websites are most important in faster moving disasters; and
- social media is growing in importance in disasters and may cause an increase in the use of other people as key sources of information during a disaster.

### *2.1.2. Influences on information seeking*

A range of characteristics, or background factors, will affect how people receive and interpret information in a disaster, including their demographics, networks, resources,

activity, knowledge, cognition, experience and distance from the disaster (Mileti & Fitzpatrick 1992). Sender characteristics were developed from the Mileti et al and Savolainen models. Some receiver characteristics were identified by the models, but others emerged progressively from the literature. The characteristics that were investigated in other studies were used in order of their emergence from the literature as a foundation for this discussion of previous research. Differences in information seeking between certain groups related to receiver characteristics such as age, cultural, gender and socio-economic status were investigated in a number of studies (Aguirre & Tierney 2001; Donner, Rodriguez & Diaz 2007; Fischer III et al. 1995; Greenberg, Hofschire & Lachlan 2002; Lachlan, Spence & Nelson 2008; Pew Research Center 2009; Phillips, Metz & Nieves 2005; Spence, Lachlan & Griffin 2007). Regarding demographic factors, however, other studies have found little or no affect on disaster behaviour or information seeking (Greenberg, Hofschire & Lachlan 2002; Johnson 2004; Lachlan, Spence & Nelson 2008; Stempel III & Hargrove 2002), perhaps because of disaster type. Among the socioeconomic factors that are thought to have an influence are education, employment, income, religion, and family ties. Education was implicated as an influence in information sources in reaction to the 9/11 World Trade Center disaster (Greenberg, Hofschire & Lachlan 2002). Aguirre and Tierney (2001) concluded that education levels influenced use of informal sources of information in a potential disaster situation, but these may have been affected by other factors such as time of day in their 9/11 study. Employment and income have also been correlated with certain information seeking behaviours in western studies. Religion in some places is thought to have an effect on reactions to disasters or threat (Aguirre & Tierney 2001). Family ties and family life stage have been shown to affect evacuation and immediate reaction to the first alert of a disaster approaching (Eisenman et al. 2007; Fischer III et al. 1995; King 2007). However, Tobin and Montz (1997, p. 153) recognize that while these factors do have an influence on hazard perceptions, "…establishing a predictive or explanatory model based on socioeconomic criteria…poses many problems" (1997, p. 153).

Disaster social scientists have explored the relationships between disaster behaviour and age, gender, socio-economic situation including employment and income, race, education, ethnicity, country of origin, family ties, religion, physical capability, life stage, and carer duties. These factors will now be considered in some detail, with the first alert, confirmatory behaviour and information seeking activity examined in each case. Mileti and Fitzpatrick's (1992) sender and receiver characteristics will be used to structure the exploration.

#### 2.1.2.1. Sender characteristics

The characteristics of the communicating agency, its messages and the forms it selects to send the message will all affect how an individual receives the message and makes decisions based on its content. Mileti and Fitzpatrick listed these characteristics as specificity, consistency, certainty, accuracy, clarity, form, frequency, source and process (1992), with Mileti later refining these to source, consistency, accuracy, clarity, certainty, sufficient information, guidance, frequency, risk location information and form (Mileti 1995).

**Message features – source and form**

Message source and form are often inseparable in the communication and disaster management fields, and in a number of studies are used interchangeably (for example, Krasovskaia et al. 2001). Characteristics of the message source and form can have a variety of effects on the receiver of the message (Austin, Fisher Liu & Jin 2012; Breakwell 2000). A variety of sources can increase the credibility and of the message (Austin & Bailey 2014; Fischer III et al. 1995; Leadbeater 2008) because individuals have "different views about who is credible and who is not" (Mileti 1995, p. 4). Messages from trusted people, such as friends, family and neighbours, were important (Austin & Bailey 2014) because they contributed to the personalisation process and can decrease mobilisation time in evacuation (Mileti 1995; Sorensen 2000), although Fischer found that households were more likely to leave if they were told to do so by emergency personnel (Fischer III et al. 1995) in an incident where emergency personnel went door to door to notify residents of evacuation.

The level of trust in a source will guide either protective action or further information seeking (Heath & Palenchar 2000). The trust issue is of particular relevance to agencies and can be affected by past experience of the individual with the disaster, the agency and the agency's spokesperson, the form organisations use to send a message and disaster type (Breakwell 2000). Trust in a risk communication setting is based on the individual's perceptions of competence, objectivity, fairness, consistency and faith (or good will) (Renn & Levine 1991). Breakwell (2000, p. 115) found that trust in a source was associated with perceptions of the level of expertise, knowledge, bias, vested interest in the situation, and propensity to sensationalise the hazard. Disaster type also affected trust levels, with greater levels of distrust in agencies when dealing with toxin situations (Breakwell 2000). (Yovits & Foulk 1985)

The form used to convey the message also affected action (Fitzpatrick & Mileti 1994) and information seeking (Austin, Fisher Liu & Jin 2012; Utz, Schultz & Glocka 2013), although Sharma found no effect of form on behaviour (2009). Fisher Liu, Fraustino and Jin attempted to clarify this (2015) by investigating the effect on social media users of form and source on their intentions to seek and share information through a range of social media and non social media channels, as well as the affect of the type of disaster on these activities. They found that social media form affected intended likelihood to seek more information and take protective action. If the initial alert came from a Tweet, they were more likely to look for more information on Twitter than a web page, and if it came from a local newspaper, they were more likely to look for more information on a local government website (Liu, Fraustino & Jin 2015). If the initial information came via a Facebook post, study participants reported they would be more likely to call people they knew than if they learned about the disaster from a web page. They also reported stronger intentions to evacuate if the initial information came by Facebook post than a Tweet (Liu, Fraustino & Jin 2015). The National Weather Service Central Region's investigation of the 2011 Joplin tornado discovered that warnings received via social networks tended to prompt a more immediate reaction than warnings from official channels or media (2011). This may tie in with trusted sources being a key source of information (Crowe 2010). Multiple forms were more likely to have greater effect (Austin & Bailey 2014; Donner, Rodriguez & Diaz 2007; Fitzpatrick & Mileti 1994, pp. 76-7). Aguirre et al. (2002) tested the use of informal and formal channels in their study on rumour of an earthquake and discovered that those who had more free time (i.e. students, unemployed, retired or housewives) were more likely to use informal channels, which reflected the findings of the Joplin study (National Weather Service Central Region 2011). The form affected how people accepted an organisation's response to a crisis (Liu, Austin & Jin 2011), so there may be some relationship between trust and form. The form used to convey the message also affected action (Fitzpatrick & Mileti 1994).

**Message features – consistency, accuracy, clarity, certainty, guidance and frequency**

In the previous section, multiple sources and a variety of sources affected reactions to communication from agencies. Multiple messages from a number of sources could result in message inconsistency (Leadbeater 2008), which can reduce the reaction time of individuals and communities in any phase of a disaster. Consistency within a message is also important – for example, a warning to evacuate should not be delivered with the message that children should be kept at school (Mileti 1995). This consistency should exist across stakeholder groups (Coombs 2007b). Even the wording used, if not aligned to terms the local community uses day to day, can cause inconsistency in messaging (Emergency Management Australia 2008; Jardine & Hrudey 1997) and lead to confusion

(Boylan, Cheek & Skinner 2013) and decision-making that endangers people. Conflicting information delivered during the Three Mile Island nuclear incident caused 21% of survey respondents to evacuate (Cutter & Barnes 1982). In the Tasmania 2013 bushfires, mispronounced location and road names and inaccurate information presented by people calling in to commercial radio stations caused confusion in some residents, as did information provided on social media by non-agency sources (Boylan, Cheek & Skinner 2013). In bushfires in New South Wales in 2013, interview respondents commented on mis-identified roads and confusing messages about which way to evacuate (Mackie, McLennan & Wright 2013). Accuracy is also a factor in consistency and can affect trust levels if the community perceives there to be errors in any part of the message or its content (Mileti & Sorensen 1990; Sutton, Palen & Shklovski 2008).

Message clarity affects comprehension of the message and subsequent behaviour. New Yorkers became confused about the safety of a mosquito eradication campaign following an outbreak of West Nile virus in 1999 because the campaign produced too many different messages (Covello et al. 2001). Community concern centred on the negative aspects of the campaign rather than the eradication of the source of the virus. Clarity is related to the simplicity of the messages, with hazards messages generally recommended to suit a basic reading level (Covello et al. 2001).

Despite simplicity increasing clarity, warnings and disaster messages require sufficient information and higher levels of detail relevant to individuals (such as guidance and the location of the event), as well as frequent repetition of the warning before the threat is perceived as real (Perry & Lindell 1991) and people can make decisions (Sutton, Palen & Shklovski 2008). Specific details about the nature of a large fire and what fire agencies wanted local residents to do had an effect on evacuation rates in Pennsylvania in 1990, with 100% of those hearing the evacuation *order* complying, but only 79% of residents hearing an evacuation *suggestion* complying (Fischer III et al. 1995). Detailed and up-to-date maps of a wildfire in Colorado in 2002 were the primary information need of survey respondents who experienced the fires (Benight, Gruntfest & Sparks 2004). Detail such as evacuation routes and safe locations (Lindell & Perry 1987; Mileti & Sorensen 1990), and the nature, location, guidance, time and source of the hazard (Mileti 1995; Sorensen 2000; Sutton, Palen & Shklovski 2008), are more likely to prompt protective action (Donner, Rodriguez & Diaz 2007; Mileti & Peek 2000). Detail is valuable, as it will deter people from filling a void with incorrect information or rumours from other sources (Mileti 1995; Sutton, Palen & Shklovski 2008). "If a hazard is well described, people are better able to understand the logic of the protective actions that are being recommended and are provided with rationale for subsequent behaviour… (Mileti 1995, p. 6)" However, when

something is not known, specificity is not possible (Mileti & Sorensen 1990). Message certainty could also be diluted if facts are unclear to emergency managers, but Mileti and Sorensen (1990) recommend provision of accurate facts delivered with a tone of voice that projected certainty, with some outline of what would happen if the uncertain thing occurred.

Message frequency may also affect behaviour. Of the people contacted twice about evacuation during the Pennsylvania fire, 100% evacuated; 79% who were contacted once evacuated; and 21% of those never contacted evacuated (Mileti 1995). In India, however, message frequency was found not to have an association with evacuation (Sharma, Patwardhan & Parthasarathy 2009), which could be a result of the influence of culture, in particular the Indian tendency to wait until the last minute, relying on sensory cues to help them make their decision (Sharma, Patwardhan & Parthasarathy 2009). Tornado warnings are most effective when they are repeated and confirmed, and preferably distributed across a range of media (Paul & Stimers 2011; Sherman-Morris 2005; Sorensen & Vogt Sorensen 2007). The number of warning sources during a tornado is a determinant of protective action (Paul, Stimers & Caldas 2015). The selection of forms and sources is important, in case one system is not working (Paul, Stimers & Caldas 2015), and the access to different forms and sources emerges as a message feature that should be considered. A number of messages in multiple forms can reduce the chance of cognitive dissonance, an aspect of decision making that can lead to delays in action or cause people to make decisions that can lead them into greater danger (Fritz 1961).

Research undertaken so far shows that many characteristics attached to the source and form of messages can affect how people behave in a disaster and influence information seeking behaviour. Table 2.1 summarises the literature on how this has occurred in the past.

**Table 2.1 Sender characteristics and their influence on disaster behavior**

| Characteristic | Features | Effect |
|---|---|---|
| **Credibility** | Based on past experience with the source; trust in agencies; credibility; agency credibility can rest with the spokesman; based on perceptions of expertise, competence, objectivity, fairness, vested interests; consistency and good will. | • Contributes to personalisation<br>• Speeds confirmation<br>• Can affect time taken to trigger action |
| **Form** | Informal and formal; ownership of forms (e.g. television and radio); access to the form (e.g. internet in isolated areas); more trust in some forms than others (e.g. official government weather website, unofficial social media sites) | • Warnings received through social networks trigger faster action than official warnings<br>• Multiple forms have greater effect<br>• Can be affected by the disaster (e.g. access to electricity, mobile phone signal) |
| **Consistency** | Messages across forms should be consistent; language can cause inconsistency | • Inconsistency causes delays in taking action while people check facts<br>• Affects trust levels in source and message |
| **Accuracy** | Messages need to be factual and the facts need to correlate with what people are seeing. | • Affects trust levels in source and message<br>• Affects perceptions of agency expertise |
| **Clarity** | Important to take into account stress levels of receivers; too many messages can reduce clarity, but people also require good detail to make decisions; basic reading level recommended for message development; visuals aid clarity | • Affects comprehension and therefore behaviour<br>• Can cause confusion if messages are complicated |
| **Certainty** | Language transmits certainty; visuals aid certainty; detail valuable | • Increased certainty increases action<br>• Reduces confirmation<br>• Prevents people filling a void with unofficial information<br>• Uncertainty can cause people to make bad decisions |
| **Guidance** | Detail allows good decision-making | • Decisions can be made faster and with confidence<br>• Evacuations occur faster |

| Characteristic | Features | Effect |
|---|---|---|
| **Frequency** | Repetition is often required to personalise the threat; frequency should involve multiple forms and sources | • Reduces confirmation time<br>• Triggers action<br>• Number of warnings a determinant of time taken to take protective action<br>• Provides for system failure<br>• Reduces cognitive dissonance and improves decision making |

### 2.1.2.2. Receiver characteristics

The background and circumstances of an individual leading up to and during a disaster affects disaster preparation, reaction to the event itself, evacuation and recovery from the disaster. Mileti, Fitzpatrick and O'Brien (1992; 1992), classified these factors as characteristics of the receiver, with Mileti (1995) ultimately developing the following sub-groupings: environmental cues, social setting, social ties, socio-demographics, psychographics, and pre-warning perception. This section will use these sub-groupings to investigate research on the influence of each on disaster behaviour and disaster information seeking.

#### Environmental cues

Environmental cues, such as smoke or prolonged rain, often act as an alert or confirmation source. The presence of environmental cues also indicates close proximity to the agent causing the disaster, thereby increasing the pressure on the decision-making process. Visual confirmation is important to some people, usually men, on hearing of a tornado (Chaney & Weaver 2008; Donner, Rodriguez & Diaz 2007; National Weather Service Central Region 2011). In flooding, direct observation of prolonged rain and rising water levels is combined with local experience to alert some people to the danger (Parker & Handmer 1998). Use of environmental cues indicates proximity to a disaster, and proximity to an impact site has an influence on the likelihood of hearing about the disaster (Sorensen 1991) and the level of personalisation (Mileti 1995). For instance, a number of studies of tornadoes showed that sirens were or could be a key alert or confirmation source (Comstock & Mallonee 2005; Legates & Biddle 1999; National Weather Service Central Region 2011). Proximity also has an influence on the requirement of the individual to have information from credible sources (Thomson et al. 2012). Environmental cues can interact with other sender factors to enable sensemaking to be undertaken, leading to: a) more information seeking; b) no action or further information

seeking; or c) protective action (Mileti 1995; Mileti & Fitzpatrick 1992; Mileti & O'Brien 1992).

Effect of proximity on disaster behaviour of individuals has been researched in several ways: nearness to the impact zone of disaster (as in King 2007; Spence et al. 2005); in terms of the individual's location at the time of warning, impact or at other key points during the disaster (such as at work or at home) (King 2007); or the population density of community the person lived in, such as rural, urban or city (Chesser et al. 2006), which in turn has been linked to social advantage or vulnerability (Morrow 1999). Proximity to the Three Mile Island nuclear reactor after the accident in March 1979 affected rates of evacuation, with those closer to the reactor more likely to evacuate than those further away (Cutter & Barnes 1982). Levels of fear and a person's proximity after the 9/11 attacks were found to be correlated, but not levels of information seeking and proximity (Spence et al. 2005). Distance of individuals from coastlines and their location in relation to low lying, flood prone areas, had a positive effect on risk perception after Hurricanes Katrina and Rita (Trumbo et al. 2011), and Lili (Lindell, Lu & Prater 2005). In response to a hypothetical terrorist attack using plague, focus group members from rural areas intended to evacuate as far from the situation as possible, while urban respondents intended to seek shelter closer to their homes (Wray & Jupka 2004).

In an information seeking context, there were differences between urban and rural residents in Wray and Jupka's study. Urban respondents reported they would look to media first for more information in a biological terrorist attack and then local authorities, while rural residents reported the reverse (Wray & Jupka 2004). Proximity may also have an effect on the source of information - internet was used more often by people closer to the disaster site during and just after Hurricane Lili (Lindell, Lu & Prater 2005).

**Social setting and social ties**

The 'social setting' that Mileti (1995) regarded as a factor that affected a message receiver's response related to family, household and neighbour influences and is based on "core networks" (Hurlbert, Haines & Beggs 2000). Social ties were Mileti's (1995) idea of how the social setting applied in the specific situation of disaster and were a facilitator of resource use and allocation in a disaster by individuals (Hurlbert, Haines & Beggs 2000). Social setting explains the networks existing between the individual and his or her family, friends and neighbours. Concepts such as community attachment produce positive behavioural and psychological outcomes and allow people to develop solutions to problems and act on these more easily (Kim & Kang 2010). This results in people with strong community connections engaging more positively in preparedness activity before

and during a hurricane (Kim & Kang 2010). 'Social ties' refers to how existing networks and connections could be activated and new ones forged as a result of the disaster at hand (Mileti 1995).

Looking at the effect of household composition on disaster behaviour, families with children are more likely to evacuate than individuals, although families will often wait until all are together, or at least the mother and children are together and the father informed, before they do evacuate (Fischer III et al. 1995). The location of the family at the time of a disaster will also affect the activity of some: parents will do their best to reunite themselves with children before following warning or coping advice. A study of the threat of a chemical accident in Alabama asked people's intentions if an accident happened while their children were at school. Three quarters of parent respondents in the lowest income quartile indicated they would travel to collect their children, and 70% of the remainder of respondents signaled this intention, even though some county preparation materials instructed them not to (Drabek 1969). Intentions may not translate into actions though, as during the 2007 Australian tsunami warnings, only 5% of respondents collected their children from school (Phillips, Metz & Nieves 2005). In preparation for a disaster though, families with children are less likely to have a specific disaster plan, use disaster experience as a trigger for changing their preparation, be aware of disaster planning guidelines published by a local authority, have knowledge of disaster plans at work, or to have a portable container in which they could carry supplies (Morrow 1999). In Hurricane Katrina, the families of elderly people who refused to evacuate usually stayed with the parent rather than split the family (Eisenman et al. 2007). Special medical needs of people in a household could affect the evacuation behaviour of those around them, particularly women (Eisenman et al. 2007), but other factors, such as marital status or the number of children were not significantly related to evacuation. Single parent households and those where a member is disabled, frail or elderly have been shown to be particularly vulnerable during a disaster, although other variables may account for disaster effect on households of this composition (Fu et al. 2010). Regarding information seeking and household composition, research has been scant. Family and neighbours are a predominant source of alerts, confirmation information and updates (Aguirre & Tierney 2001; Donner, Rodriguez & Diaz 2007; Eisenman et al. 2007; Greenberg, Hofschire & Lachlan 2002; Legates & Biddle 1999; Palen et al. 2009; Taylor, K. et al. 2009), but specifics about these have not been explored.

Given that people with dependents (such as children, the elderly, disabled) have been found to behave differently to non-dependent households in a disaster, it might be reasonable to think that their information seeking behaviour could also be different.

During the 2007 east coast of Australia tsunami warning, there was a small difference between the types of households and the contribution of 'other people' to a tsunami alert (King 2007). People living alone heard about the tsunami by commercial television, commercial radio (24% each) and from word of mouth, colleagues at work and at a business (37%), whereas families with children were more likely to hear about the tsunami by commercial radio (33%) or word of mouth (including at work, school or shop, 43%). Commercial television was, for this group, the third ranked alert source at 18%. The biggest difference was with the elderly living with family, who heard about the tsunami from only two sources - commercial radio and commercial television equally, with none reporting first hearing from others about the incident (King 2007).

Living with a disabled person reduced a household's likelihood of evacuation by about half before Hurricane Bonny, even when evacuation had been ordered by agencies (Bateman & Edwards 2002). In Hurricane Dennis, 35.3% of disabled households evacuated when ordered compared with 41.3% of non-disabled households; but in Hurricane Floyd, the evacuation rates for households of disabled people compared with households without a disabled person were roughly the same. Households with members with mobility problems were the least likely to evacuate (compared with disabilities such as vision- or hearing-impaired) (Van Willigen et al. 2002). Households with a disabled member that did evacuate generally delayed the decision for a longer time than householders without a disabled member (Van Willigen et al. 2002). Disabled people were just as likely to have an emergency kit as the general population of New Orleans in Hurricane Katrina, but less likely to have an evacuation plan (40.4% of the general population had a plan, while 34.1% of disabled had a plan) (Van Willigen et al. 2002). Spence, Lachlan, Burke and Seeger found a statistically significant difference in information seeking by disabled people compared with other demographic features, and that television was their most important source of information (43.9% of the disabled respondents to the survey), followed by face-to-face communication with other people (26.5%), communication over the telephone (10.9%) and 3.9% relying on interpersonal communication with strangers. They also found that disabled people were less likely than the rest of the population to consider as important information on the scope of the damage, government response activity, rescue operations, larger impact of the storm, who was affected and the impact on friends and family. They were much more concerned with survival issues such as food/water distribution, evacuation, shelters, and healthcare/medicine (Spence et al. 2007). In China after the 512 Wenchuan earthquake, mobile phones were the most relied upon form for securing information for disabled people, with 38.2% of disabled respondents to a survey using their mobile phone daily (Fu et al. 2010). Their pre-earthquake preference for television as a source of information

(81.8% used television daily before the earthquake) was disrupted by power cuts and housing disruption. Daily television usage dropped to 21.8% by disabled respondents after the earthquake. Radio increased from 12.7% daily use before to 29.1% after the earthquake. This study by Fu, White, Chan, Zhou, Zhang and Lu (2010) did not report comparisons with the able-bodied population.

Neighbours also have an influence on how people receive and interpret information in a disaster. During the Three Mile Island nuclear accident, evacuees' neighbours were more likely to evacuate than those of non-evacuees (Cutter & Barnes 1982), which was presumed show the influence of neighbours' actions on decisions made by evacuees. Alerts from neighbours were reported amongst interpersonal alerts for people involved in Hurricane Katrina evacuation decision-making (Taylor, K. et al. 2009); with family as the main form of alert and most important form of information on a tsunami in Sri Lanka (Kurita et al. 2006); neighbours were one of the top three avenues of emotional support during and post-Hurricane Katrina (Elliott & Pais 2006).

Social ties have been found to affect disaster behaviour – for instance, during the Three Mile Island nuclear accident, people who knew people working in the facility were less likely to evacuate than others. From an information seeking perspective, knowing someone in an agency can provide an extra trusted source of information (Cohen, Hughes & White 2007).

**Socio-demographics**

Demographic factors are an important influence on how people behave and their information seeking patterns in general life as well as disaster. As part of the receiver characteristics, Mileti (1995) uses the term 'socio-demographic characteristics' to cover aspects such as age, gender and class, but also access to resources. This section will investigate age, gender, education, race/ethnicity and resources (including income).

***Age***

Age has an effect on many aspects of an individual's reaction to certain disasters. It has been linked to hurricane preparation (Sorensen 1991) and trust in television weather forecasters (Sattler, Kaiser & Hittner 2000), trust in television generally (Piotrowski & Armstrong 1998; Sattler, Kaiser & Hittner 2000; Taylor, K. et al. 2009), optimism about the risk when facing a hurricane (Burger et al. 2013), evacuation compliance (Trumbo et al. 2011), speed of reaction to an impending threat (Sorensen & Vogt Sorensen 2007), disaster knowledge (Kuppuswamy 2014) and concern about terrorist attacks (Drabek 1999). Media

use differs according to age (Greenberg, Hofschire & Lachlan 2002) but it has no influence over the decision to take protective action in a tornado (Paul, Stimers & Caldas 2015).

In a bridge collapse in Minneapolis, Minnesota in 2007, 35% of respondents in their 20s were more likely to learn of the disaster via mobile phone, via voice or text (Lachlan, Spence & Nelson 2010) compared with 7% of respondents in their 50s. No-one over 30 learned of the disaster via text message. While demographic information was not collected in the Palen, Vieweg, Liu and Hughes study (2009) of the Virginia Tech massacre, an assumption could be made that most of the respondents and participants in this study were college students and therefore part of a young group within the community. This group used text and instant messaging, and social media as their main sources of information. Older Americans were more likely to learn about the 2009 swine flu epidemic from newspapers than any other source, with two thirds of those over 40 using this medium more than any other (Pew Research Center 2009). The tipping point in the Pew study seemed to be the age of 40, with those under this age more likely to use the internet more than any other medium.

However, several studies of the 9/11 World Trade Center attacks (Roeser & Schaefer 2002; Ruggerio & Glascock 2002) found little difference between the information seeking actions of young people (median age 22.5) and other studies of the same incident involving people of much older median ages (Greenberg, Hofschire & Lachlan 2002; Stempel III & Hargrove 2002). Age was a predictor of the perceived usefulness of the internet and print media, with young people more likely than other age groups to find both more useful. This age group was less likely to find radio and television useful (Spence et al. 2006). The newspaper result was unexpected to the authors and may have been explained by a predominance of college students (who were provided free newspapers by their universities) in the younger sample. This might point to accessibility influencing usefulness. All age groups used television as the main source, with 'other people' the second preference for information in the days after the incident. Television emerged as the main source of information in a number of studies using more than about 350 respondents and dealing with a range of US disasters (Chaney & Weaver 2008; Drobot, Schmidt & Demuth 2008; Legates & Biddle 1999; National Weather Service Central Region 2011; Paul & Stimers 2011; Piotrowski & Armstrong 1998). Similarly, people reporting on flood information sources in 2004 in Denver, Colorado and Austin, Texas preferred television as the main source of information across age groups. In Denver, 42% of 18-35 year olds, 44% of 36-65 year olds and 52% of those older than 65 relied on television for news of the flood. In Austin this was 51%, 47% and 53% respectively. Chi square testing, however, showed statistical significance between groups in terms of most important source of

information even though television emerged as the most used information source for each age group (Hayden et al. 2007).

While younger people were more likely than other groups to name the internet as their main source, only 9% of Denver 18-35 year olds and 11% of the Austin age group identified the internet as their main form of information on the floods. Again, these differences, when compared with other age groups, were statistically significant. This may have changed in the 10 years since this flood study was undertaken. The Hayden et al.. (2007) study was among the most rigorous found, as the "information sources" it used were all a form of media, with no mixture of direct sources into the list of choices (such as the local mayor, a friend, an agency website or the television weather man).

However, in some studies, age has not indicated differences across groups when it comes to information seeking. Ruggerio and Glascock (2002) reported a high incidence of internet usage in disaster not related to age that intensified with time. They found that 62% of respondents used the internet compared with Greenberg's 35% (2002) and Roeser's 2% (2002). King's research (2007) showed that the over 50s received tsunami warnings at the same levels as the general population. In other studies, evacuation rates for older people were the same for younger age groups.

***Gender***

Differences between the reactions and experiences of men and women in a disaster have been well documented (Enarson & Morrow 1998; Eriksen, Gill & Head 2010; Ruggerio & Glascock 2002; Stempel III & Hargrove 2000; Tyler & Fairbrother 2013a; Whittaker, Eriksen & Haynes 2015), although not well researched in Australia (Enarson & Meyreles 2004; Tyler & Fairbrother 2013b). Women are more likely to perceive a greater threat in an approaching disaster than men, and white men were most likely, in the United States at least, to perceive less risk than others in the same situation (Meyer 2010). Women were more likely than men to evacuate (Beringer 2000; Whittaker, Eriksen & Haynes 2015), even with mediating factors eliminated that might influence more women to evacuate than men (Fothergill 1996). Having children also affected women's decisions on bushfire evacuation, timing and post-disaster review of actions by individuals (Proudley 2008; Tyler & Fairbrother 2013b). Analysis of deaths in bushfire in Australia show that while men were more likely to die in a bushfire while outside protecting assets and women more likely to die taking shelter or evacuating, a proportion that has increased since 1955 (Whittaker, Eriksen & Haynes 2015). Data from research on 1998 Hurricane Bonnie showed that socio-economic factors such as household income, age, education and work

structure were found to cause no significant differences on evacuation rates of men and women, and similarly for household composition factors such as being married, being a single parent, number of children and adults in the household (Bateman & Edwards 2002). However, being retired and living with a person with special needs were two factors found to have some effect on female decisions to evacuate, although more women reported living with a special needs person than men in the data that Bateman and Edwards (2002) considered.

Women were more likely to have an evacuation plan, and having an evacuation plan influenced evacuation across gender (Bateman & Edwards 2002). In bushfires, having a plan was not a guarantee of action – many Australian studies have revealed conflict within families over a bushfire plan as the fire approached, when men decide to stay and defend even though the plan was to leave early (Teague, Ronald & Pascoe 2010; Tyler et al. 2012) They were also more receptive to educational initiatives (Eriksen 2014). Living in a mobile home, even after controlling for the higher number of females living in a mobile home, influenced evacuation decisions for women (Bateman & Edwards 2002) as did perceived risk of flooding. "…Sex differences in evacuation were not caused by inherent or 'natural' differences between the sexes. Rather, women were more likely to evacuate than men because of socially constructed gender differences in other factors that influence the intention and capacity to evacuate" (Bateman & Edwards 2002, p. 116; Proudley 2008). This study showed that all demographic factors need to be considered in terms of their effect on each other before conclusions can be made about effects and influence.

Men will evacuate with their families often to 'keep the peace' (Drabek 1969) or insist or assume that their families will evacuate while they stay (Eriksen, Gill & Head 2010), and men have been found to prefer to stay and even to change the agreed early evacuation plan at the last minute to 'stay and defend' in bushfire situations in Australia (Handmer, O'Neil & Killalea 2010; Whittaker, Eriksen & Haynes 2015). Males sometimes elect to stay behind in an evacuation to protect their property in bushfire (Whittaker, Eriksen & Haynes 2015), and in one Denver flood study to 'prevent looters' (Drabek 1969).

When it came to information seeking in a disaster, Fothergill (1996) described gender as "an important variable at this stage", because of the importance of social networks in receiving warning and disaster information. Women were more likely to hear warnings from personal contacts and then relay warnings to their husbands (Drabek 1969) and while the women took the warnings seriously, their partners were sceptical (Drabek 1969). This was supported by Australian research into the actions of people during the Black

Saturday bushfires in Victoria in 2009 – women were more likely to act on advice from relatives, friends, neighbours and emergency services (Whittaker, Eriksen & Haynes 2015). Television and radio were found by women to be more useful for obtaining information about the 9/11 terrorist attacks than men, who found the internet more useful than did women (Spence et al. 2006). However, in disaster research there seems to be small significant difference between men and women in the forms and sources they use.

Gender can also play a role in the confirmation process that Mileti and others (Mileti 1999; Mileti & O'Brien 1992; Mileti & Peek 2000) determined as a critical step in reaction to a disaster. Men were more likely to visually confirm what they had been told, even if the warning included instructions to take action immediately (Donner, Rodriguez & Diaz 2007 p. 7). Women were generally more active in information seeking after a crisis (Spence et al. 2007) although there was at least one exception: this did not apply in a bridge collapse (Lachlan, Spence & Nelson 2008; Lachlan, Spence & Nelson 2010). However, information sources between men and women seemed not to differ significantly (Ruggerio & Glascock 2002).

***Education***

Level of education appears to have some influence on disaster behaviour, with more highly educated people slightly more likely to evacuate than those with a lower education, although in at least one study, the association was found to be weak (Cutter & Barnes 1982). Even after controlling for age, the researchers were reluctant to draw correlations between education levels and evacuation rates because of conflicting conclusions drawn in previous studies (Cutter & Barnes 1982). However, people with more education were more likely to have more preparation knowledge (Kuppuswamy 2014).

Regarding 9/11 information seeking, education seemed to have some impact on the first source of information, with 48% of the group with the lowest education in Greenberg's (2002) respondents using television as a first source compared with 25% of the group with the highest level of education. However, the study team recognised that this could be a function of where people were at the time: half of the two groups with lower education levels were at home, while 33% of college educated respondents were at home. Their caution seems justified, as other research has found no significant difference in the activities of people of differing education levels during a disaster (Boyle et al. 2004; Taylor, K. et al. 2009).

However, the greater the level of formal education of those in a disaster, the less they tended to use informal sources of information (Aguirre & Tierney 2001), although environmental cues for flash flooding in Austin, Texas were more likely to be a main information source for people with at least some college education (Hayden et al. 2007). Austin residents with a high school education were more likely to list the Weather Channel and local television as their main sources. This contrasted with the responses of Denver, Colorado residents in the same study, with education having no significant effect on main sources of information (Hayden et al. 2007).

These few studies point to conflicting evidence regarding the impact of education on information seeking patterns, which could be due to the disaster type, time of day or other factors.

***Race/ethnicity/minority groups***

Race and ethnicity have each been demonstrated to have an effect on disaster behaviour in the United States, although many studies do not explain if they have accounted for other linking factors such as education, income, location and type of housing. No studies outside the United States that consider the effects of race or ethnicity on disaster behaviour or information seeking were found. Leading up to Hurricane Katrina, which hit New Orleans in 2005, African Americans evacuated a half a day later than other groups (Taylor, K. et al. 2009) – but this research was based on interviews with a respondent population that did not reflect the true population of New Orleans before the hurricane. As well, the data was not analysed to take into account effects of other factors such as access to transport, education, income and gender. Similar research on evacuation and other preparations for Hurricane Ike in 2007 that did not account for other factors (Burke, Spence & Lachlan 2010) has shown that there were considerable differences between numbers of Caucasian, African American, Latino and Asian evacuees. Of the African American respondents to the Burke et al. survey, 12% reported they had to evacuate before the storm, compared with 3.2% of Caucasian respondents, 8.3% of Latino respondents and 8.9% of Asian respondents. There were also differences in other aspects of preparedness: 71.3% of Caucasians had a first aid kit, 65.8% of Asians, 64.8% of Latinos, and 49.4% of African Americans (Burke, Spence & Lachlan 2010).

Information seeking differences also appear between ethnic and cultural groups: in the Austin and Denver preferred flood warning study, whites were more likely to use environmental cues than Hispanics (23%:17%) and local television (45%:38%), while Hispanics were more likely to use The Weather Channel than whites (25%:2%) (Hayden et al. 2007). However, in Austin, whites were more likely than Hispanics to think they would

use environmental cues (16%:7%) and local radio (13%:4%); while Hispanics were more likely than whites to use television (59%: 46%) and The Weather Channel (19%:10%). In the 1998 Oakgrove, Birmingham tornado, 67% of black people learned about the tornado from television and 80% of whites were alerted by television (Legates & Biddle 1999), indicating different day-to-day media use patterns. The Hurricane Ike study (Burke, Spence & Lachlan 2010) explored information seeking differences across ethnic backgrounds, and showed that there were significant differences. This applied to information on both government response and evacuation efforts, with African American respondents more likely than other groups to look for information on both (Burke, Spence & Lachlan 2010). There were also significant differences in the reliance on television as a primary source of information: 49.6% of African Americans considered television "very important", 48.4% of Latinos considered it "very important", 74.6% of Caucasians and 78.9% of Asians thought the same. Interpersonal sources of information were considered "very important" for the Asian respondents (65.8%), African Americans (49.6%), Latinos (48.8%) and Caucasians (37.1%). Perry and Greene (1982) found evidence that American minority groups "define danger from the environment in different ways".

As with gender, there may be effects of other variables on race and ethnicity such as location, income, education and gender itself.

***Resources***

Access to resources was a characteristic identified in the risk communication process as likely to affect disaster behaviour (Mileti 1995; Mileti & Fitzpatrick 1992). Lack of resources is a barrier to evacuation in Hurricane Katrina (Eisenman et al. 2007) and refers to lack of access to a vehicle, being able to afford fuel and other supplies while evacuated, and fear of losing a job (Eisenman et al. 2007; Elliott & Pais 2006; Lindell, Lu & Prater 2005). Taylor et al. (2009) reported that people from their study with household incomes of less than $10,000 a year evacuated a full day later than others. Kuppuswamy demonstrated the problems of communicating warnings to people who do not have internet, television or radio because of their low income (2014), and Sharma, Patwardhan and Parthasarathy linked housing quality with information seeking patterns in India (2009). Internet access (or lack of) is another resource that could affect information seeking – in India, where the studies of Kuppuswamy and Sharma et al. were undertaken, 20% of the population had access (which is not the same as a connection) in July 2014 (Internet Live Stats 2014).

The effect of income on disaster behaviour can be associated with other factors such as education, household composition, housing type and location, and has not often been

explored apart from studies relating to vulnerability in disaster. Morrow (1999) linked disaster vulnerability to indicators of poverty such as age, income, single parent households, construction of dwellings (that is, trailer parks and demountable buildings are more likely to be inhabited by the poor), lack of access to private transport and other factors. She said this pointed to limitations on the behaviour of the poor in a disaster – for example, being unable to evacuate because of lack of access to public transport, or having no resources to fund the flight to an evacuation centre. This makes effect difficult to measure without mediating for other variables, but also indicates there may be effects on information seeking behaviour.

Studies that have attempted to distinguish the effect of income from other variables have looked at belief in disaster myths (with no significant effect) (Wenger et al. 1975), effect on evacuation (with very low significant effect) (Prater, Wenger & Grady 2000), likelihood of evacuation (with no significant effect) (Bateman & Edwards 2002), or influence on preparation for a storm (with significant effect) (Spence et al. 2007).

Regarding information seeking, Phillips, Metz and Nieves' research (Phillips, Metz & Nieves 2005) into the preparedness and potential response of people in the lowest income quartile living in the vicinity of a United States Army chemical store, those on low incomes had significantly greater concerns about how informed they were. In addition, they were significantly more likely to seek more information before they took action, and they would be more likely than higher income groups to seek this information via television, neighbours, friends and relatives. However, the analysis in this study did not seem to account for the influence of other factors, such as poor health, age or mobility problems that can be associated in greater numbers amongst people on low incomes.

***Psychological characteristics***

The psychological characteristics that influence reception of a warning about a disaster include cognitive abilities, personality and attitudes (Mileti 1995) and type and recency of experience (Mileti & O'Brien 1992).

Cognitive processes are framed by situational factors such as the type of disaster, physical capabilities, past experience and access to resources. People will tend to dismiss warnings if taking action on these warnings is made difficult by their lack of mobility and resources (Paul & Stimers 2011), the lack of information about the place they would evacuate to (Eisenman et al. 2007) or in the case of New Orleans, too much information (Taylor, K. et al. 2009) and, especially in the case of the elderly, past experience (Eisenman et al. 2007).

Cognitive abilities and processes can also explain women taking cover in tornadoes before men (Sherman-Morris 2005) and people being either responsive to warnings because of past experience, or dismissive of warnings because past experience was not so serious or their memories have faded over time (Sherman-Morris 2005).

Lack of experience with a disaster may lead to increased information seeking. Blake et al.'s (2004) study of behaviour in the World Trade Center on September 11, 2001 showed that of seven post-impact behaviours outlined in section 2.1, gathering or providing information was the behaviour that was most often nominated, with 55% of those in the sample reporting this activity. When the material was analysed for behaviour order, 62% reported seeking or providing information as their first behaviour, 48% reported it as their second action and 61% reported it as their third action before evacuating the tower they were in. People in Tower 2 were found to evacuate more quickly than those in Tower 1 (Blake et al. 2004), which was attributed to those in Tower 2 having more information because they could see what was happening in Tower 1. However, Ripley (2009) reported that one large organisation based in Tower 2, Morgan Stanley, with almost 2,700 employees stationed in the building, had a well-prepared and practiced evacuation plan and all but 13 staff evacuated safely on that day. Staff members were experienced and well-directed and did not need to stop to gather information (Ripley 2009). This may have accounted for a large number of those in Tower 2 who evacuated immediately, while few in Tower 1 acted as quickly. It was the amount of past experience and how recent that experience was that helped determine the time it took for people in a disaster to understand what was happening and to take action (Fritz 1961). Those in the World Trade Center who had also experienced the 1993 World Trade Center bombing evacuated immediately (Connell 2001).

When Dow and Cutter interviewed people who had experienced both Hurricanes Fran and Bertha in United States in 1996, they found that past experience was not a factor with influence on behaviour (Dow & Cutter 1998). The strength of the hurricane study and Connell's World Trade Center study was that the researchers were able to talk directly to the research respondents, whereas the Blake and Ripley observations were taken from media reports and a very small number of in-depth interviews.

Donner, Rodriguez and Diaz (2007) found in interviews in two United States communities that had been struck by tornadoes that respondents who had not experienced a tornado tended not to believe official warning information and therefore took no action. "Social interaction at the time of the warning was found to either reinforce these imputations or,

in other instances, transform a sense of normalcy into an awareness of the threat" (Donner, Rodriguez & Diaz 2007, p. 6). However, previous personal experience in some communities did not necessarily lead to better planning or preparation or even their perception of danger (Chaney & Weaver 2008). Previous experience of a disaster had no impact on populations ordered or asked to evacuate, with 74% of both evacuees and non-evacuees reporting that they had been through a hurricane before Hurricanes Bertha and Fran hit their area in 1996. In fact, for people living in an area that regularly experiences disaster, preparation and seeking information on the 'usual' disaster could be described as routine, because it occurs at the same time every year and is so much part of life that the preparedness messages are not perceived as "worthy of attention" (Perez-Lugo 2004, p.219).

At the other end of the scale, Helsloot and Ruitenberg (2004) discussed the emergence of disaster 'sub-cultures' in communities that have experienced disaster before, with this sub-culture enabling the community to react quickly to a warning or disaster impact. However, these sub-cultures seemed to apply only to the type of disaster the community had experienced; communities with such sub-cultures were not necessarily prepared for a range of different disasters.

No experience can also affect disaster response. Those involved in any disaster living in an area that had not recently experienced a disaster would struggle to adopt a new frame of reference without more information (Fritz 1961).

Social networks were important in the confirmation stage and also for developing protective action in some communities (Donner, Rodriguez & Diaz 2007, p. 5; Romo-Murphy, James & Adams 2011) and as sources of social memory (Eisenman et al. 2007) that passes on the experience of a community. This social memory was evidenced during the 2004 Boxing Day tsunami, in which most members of the Simeulue Island community survived because of an oral history recounting the 1907 tsunami that allowed them to comprehend what was happening and escape before the wave arrived, whereas other communities did not have this experience to pass on and so lost many of their population (Romo-Murphy, James & Adams 2011`).

Once confirmatory messages are secured and information processed, people tend to use other observations of the situation, including past experience or lack of experience in similar situations (Mileti & O'Brien 1992; Ripley 2009) to determine their response (Quarantelli 1990). "...people's images of the future are shaped by their experiences of the

past, and a major constraint on human ability to use hazard information, such as a flood warning, is basic reliance upon experience" (Drobot & Parker 2007, p. 174). Some elderly people in New Orleans in the lead up to Hurricane Katrina refused to evacuate because they had emerged unscathed from other big hurricanes that had passed New Orleans previously (Eisenman et al. 2007). This "optimism bias" was evident in the 2011 Joplin, Missouri tornado (National Weather Service Central Region 2011), where a small number of people who had experienced the region's regular, much smaller tornados did not believe that this tornado would be more dangerous than previous storms (Paul & Stimers 2011;National Weather Service Central Region, 2011 #505). In contrast, in the Fischer et al. (1995) study of a fire emergency, people with previous experience of a disaster that resulted in an evacuation in their neighbourhood were more likely to evacuate (87% of those with previous experience) than those that did not have experience (53% of those who reported no experience).

These mixed results point to the influence of other factors, including locus of control (Legates & Biddle 1999; Mishra, Suar & Paton 2009), with an external locus of control associated with reduced preparedness for flood and heat wave (Mishra, Suar & Paton 2009) and tornado (Legates & Biddle 1999) in experienced communities.

Locus of control was a psychological factor that Mileti and many other researchers have identified as affecting disaster behavior, including information seeking. Rotter (1966) first defined locus of control as the level of belief that an event is contingent upon own actions or chance, luck or fate. External locus of control is the belief that own actions can have no effect on the outcome, while internal locus of control is the belief that own actions can affect the outcome (Rotter 1966). External locus of control significantly predicts denial and behavioural disengagement and is significantly related to higher levels of worry following hurricane (Scott et al. 2010). Individuals who adopt an external locus of control are also less likely to develop adaptive plans to deal with a disaster (Perry & Green 1982), whereas those with an internal locus of control will actively prepare (Sattler, Kaiser & Hittner 2000). Locus of control mediated effects of other characteristics such as experience and knowledge of what to do (Mishra, Suar & Paton 2009) and internal locus of control was linked to higher education levels and smaller households in its effect on a higher level of preparedness (Karanci, Aksit & Dirik 2005). The effect of locus of control on information seeking behaviour has not been investigated, but in an organisational setting, those with an internal locus of control tend to seek more information and can process more complex information (Phares, 1976, cited in Spector 1982).

In summary, the environment, social ties, demographic factors and psychological factors can all have some effect on disaster behaviour and information seeking in a disaster. Table 2.2 summarises the key findings from disaster research.

**Table 2.2 A summary of the literature on receiver characteristics and disaster behaviour**

| Characteristic | Effects |
|---|---|
| **Proximity/location/ environment** | • People closer to the impact zone are more likely to use environmental cues as a source of information<br>• People closer to the disaster impact zone will seek different information to those further away<br>• Rural and city residents have used different sources of information in at least one previous study |
| **Social ties** | • Family and neighbours (other people) are a predominant source of alerts<br>• Family and neighbours can influence post-information decision making<br>• Social ties outside a day to day social network can be used during a disaster as a source of information |
| **Household composition and dependents** | • Household structure influences the source and form of alerts and subsequent information<br>• The relationship between having a dependent in a household and information seeking does not seem to have been explored<br>• Disabled people will seek different information to those who are not disabled |
| **Age** | • Young people will prefer new technology as their medium, and friends as their source<br>• Most people will use television as a key medium<br>• Television weather forecasters are a trusted source for most age groups<br>• Internet is an increasingly important medium for most age groups |
| **Gender** | • Relationships exist between gender and disaster behaviour and also gender and information seeking<br>• While women engage in higher levels of information seeking and regard some sources as more important than men do, men and women use much the same information forms and sources in a disaster<br>• Men are more likely to seek visual confirmation once they learn about a disaster<br>• Social networks are important sources of information for women in a disaster or crisis |

| Characteristic | Effects |
|---|---|
| | • Gender influence on information seeking may have mediating factors such as education, household composition, experience and resources |
| **Education** | • Level of education may have some effect on first source, but previous studies have not been emphatic<br>• People with lower levels of education might use personal contacts more often as part of their information seeking behaviour<br>• Other variables may be indicated in results that show effect of education on action |
| **Race and ethnicity** | • As with gender, there may be effects of other variables on race and ethnicity such as location, income, education and gender itself<br>• Studies of the influence of race in disaster and disaster information seeking behaviour have predominantly been undertaken in the United States<br>• In that country, there are differences in information seeking between whites, Asians, Latinos and African-Americans<br>• Television is the main source for whites, Hispanics and African-Americans in the United States, with differences between groups on the levels of usage<br>• Other people are another key source for all groups, but more important for Asians than other groups |
| **Resources** | • Researchers have secured mixed results in determining whether income has an effect on behaviour in a disaster<br>• Income as a variable needs to be mediated for other factors such as household composition, age, disability, education and gender |
| **Experience** | • In most disaster types, experience in a certain type of disaster will help communities prepare for and react to a recurrence of that disaster, but it appears this may not apply in hurricanes and tornadoes or for a disaster that community has not experienced before<br>• Lack of experience may extend the sensemaking activity in the confirmation stage |
| **Locus of control** | • Individuals with an external locus of control are less likely to have disaster plans<br>• Those with internal locus of control will actively prepare<br>• Internal locus of control was linked to higher income households and smaller households in effect on higher levels of preparedness<br>• In an organisational setting, those with an internal locus of control tend to seek more information and can process complex information |

**An overview of influences on disaster information seeking**

The previous section produced a list of complex factors that could have an impact on how people look for information in a disaster. Key points from the literature on these influences has been summarised in Tables 2.1 and 2.2 earlier in this section. The chapter will now consider disaster information seeking pathways and then into the next stages of this literature review.

### *2.1.3. Disaster information seeking pathways*

Research that identifies and quantifies information seeking pathways, that is, the sequence of forms and sources used by people affected in some way by a disaster, is extremely hard to find. Palen and Liu (2007) were the first to identify communication pathways in a disaster, but used the term in a more general way to explain use of specific sources. Their pathway typologies, rather than being specific in terms of first alert, confirmation source and then other sources, explained the general information seeking process in terms of the groups of communicators involved in the process. For example, they drew attention to three information pathways that were made possible or greatly enhanced by the use of information communication technology: firstly, communication within the public affected by the crisis; second, between members of the public who are affected by the crisis and those outside it; and third, between the official public information officer function and members of the public (Palen & Liu 2007).

A range of other studies have asked questions about the first alert and some also asked questions about the confirmation source and the source that was used most often after the alert/confirmation phase . However, none seem to have plotted the sequence of sources to establish if there are patterns, even between the just the first alert and the confirmation source.

## 2.2. Information seeking framework foundations

Section 2.1, which was Stage 1 of the literature review, considered the features of information seeking in the context of a disaster. A model that was developed by Mileti, O'Brien and Fitzpatrick (Mileti & Fitzpatrick 1992; Mileti & O'Brien 1992) was used to determine the influences on disaster information seeking, but it did not provide a detailed picture of what people did to secure information. An alternative model that was developed in the general information seeking literature will be useful to provide this detail. This section, Stage 2 of the literature review, will outline the second framework

that will guide this study, which is a model for problem-specific information seeking, developed by Savolainen (1995), for non-work every day life information seeking. Savolainen's model will be used in this study as a basis to explain information seeking in the new context of the impact phase of a disaster. At the end of the section, the information seeking process uncovered during consideration of Savolainen's model will then be reviewed in light of influences on information seeking identified in Mileti's model and earlier in this literature review. Figure 2.3, below, shows where this current section is located in the literature review process.

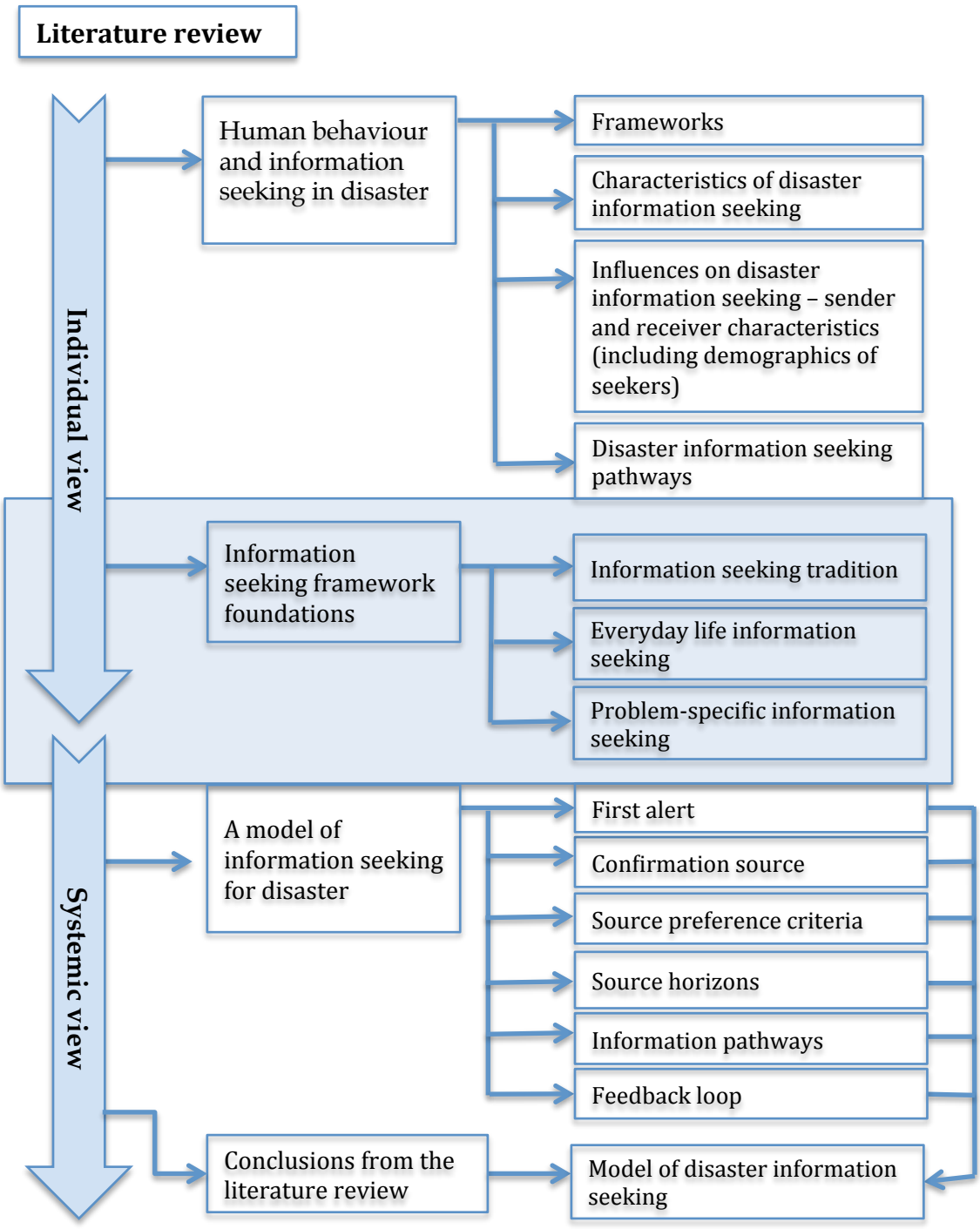



**Figure 2.3 A map of Chapter 2 – where you are in the literature review**

Historically, many information seeking frameworks have been developed from information behaviour research into library use or information retrieval from a specific repository such as the internet (Case 2008). This extended into general information behaviour and everyday information seeking research in the 1970s (Case 2008; Wilson 1999), around the same time information seeking research went beyond researching the channels (described as forms in this study) and task-orientation of information seeking. The emphasis shifted to the people looking for information – their needs, motivations, uses of the information and the sense they made of the information (Case 2008). Task-oriented studies investigated what information seekers did to secure the information while non-task-oriented studies researched why and how people searched for information (Case 2008). In securing information, seekers fulfilled one of four levels of need (Case 2008): seeking answers, involving the development of a strategy of search, and frequently a change in the type of answer anticipated or acceptable as the search or negotiation continues (Taylor 1968); reducing uncertainty, where people look for information strategically when faced with uncertainty in conversation, social situations (Berger 1985) or a specific problem (Atkin 1973) ; and sensemaking, which investigates the production of meaning from information seeking (Dervin 1999). This study will focus on the task-oriented, seeking answers level, which will lay the groundwork for research into the more complex levels of information seeking. However, the literature review and the Mileti, O'Brien, Fitzpatrick model, have shown a complex relationship between non-disaster influences and information seeking in disaster, indicating that an information seeking model hoping to explain this activity will have to consider these influences.

One model that has potential to accommodate both the task-oriented focus and the influences on disaster behaviour was Savolainen's problem specific everyday life information seeking (ELIS) model. ELIS was first effectively brought into the information seeking discourse by Dervin in the mid-1970s (Case 2008). Problem-specific information was one of two models that attempt to explain every day life information seeking, the other being seeking of orienting information (Savolainen 2007a). In developing the problem-specific version, Savolainen (2007b) was heavily influenced by the individual-centred approach of Dervin, in which the focus was removed from the system and onto the individual. This system focus was one of the features of previous task-oriented information seeking work (Case 2008). Savolainen (1995) thought the system-centred approaches "…in their crudest form, reduce information seeking to library use being predicted by demographic variables such as sex and education…", whereas Dervin's sense-making approach considered the situation itself. The system-centred approach considered the enclosed system in which the information seeker worked, described as library systems, information systems, or the total system of scientific and technical

communication (Wilson 1994) and related to the users' interactions with the system rather than the users' needs. The system-centred approach dominated information seeking research until the early 1980s (Wilson 1994).

In Dervin's individual-centred model, a problem represents a gap, knowledge provided by information represents a bridge, and these two factors shape the strategies used by the information seeker as they search for meaning (Case 2008). Dervin's intention was to avoid the trap of predicting information seeking by personality traits or disposition, which she said produced results that were inconsistent and which she thought suffered from the lack of a general theory that tied it all together (Savolainen 1995). However, Savolainen (1995) felt that Dervin's sense-making model did not allow examination of individual characteristics of information seekers or provide for any analysis of cultural or social factors that might influence an information seeker. This hindered predictions around information seeking behaviour. Instead, he turned to three basic concepts on which to base his research (Savolainen 1995): Bordieu's idea of habitus; mastery of life; and everyday life information seeking. He later added problem specific information seeking (Savolainen 1995), arriving at the model to be used in this study.

### *2.2.1. Everyday information seeking*

Bourdieu's habitus was a system of thinking guided by the social and cultural situation of the thinker (Bourdieu 1984), and one that Savolainen believed provided a natural background for information seeking as part of everyday life. He described habitus as the base on which a person's way of life is organised, and way of life, or order of things, as the practical manifestation of habitus (Savolainen 1995). From this point, he explored mastery of life, an active or passive activity in which success results in a sense of coherence. Active mastery of life occurs when a problem arises and the sense of coherence is interrupted, "…where the order of things has been shaken or threatened" (Savolainen 1995). The main factors of mastery of life are comprehensibility, manageability and meaningfulness of stimuli. Individuals do things in certain ways according to their culture, and the experiences provided along the way within the parameters of this culture, and this guides the development of information seeking habits. These habits then form part of the second concept, mastery of life, often in the unconscious and therefore not at a level of awareness that leads people to question or review their information seeking activity. There are four approaches to mastery of life that Savolainen also terms 'problem solving style' (Savolainen 1995): optimistic-cognitive, when the information seeker expects no setbacks in problem solving; pessimistic-cognitive, when the information seeker anticipates some setbacks; defensive-affective, where failures are expected; and pessimistic-affective, a form of learned helplessness where failures are seen as inevitable.

The third concept that forms the basis of Savolainen's model of problem-specific information seeking is everyday life information seeking (ELIS), which describes the ways a person solves problems based on his or her values, attitudes, situation and interests. It emphasises the way a person's cultural background and experience can influence a preference for certain sources, with the relevance of sources in certain situations judged on their familiarity and past effectiveness. This model overcame Dervin's criticisms of the dangers of using demographics as a predictor of information seeking by incorporating social and cognitive capital (Case 2008; Savolainen 1995), which allows the influence of the combination of a number of situational factors to be understood. Case (2008) described the ELIS model as "…less of a depiction of a causal process than a list of important concepts that must be explored in an in depth interview" (Case 2008, p.132). The model is pictured below in Figure 2.4.

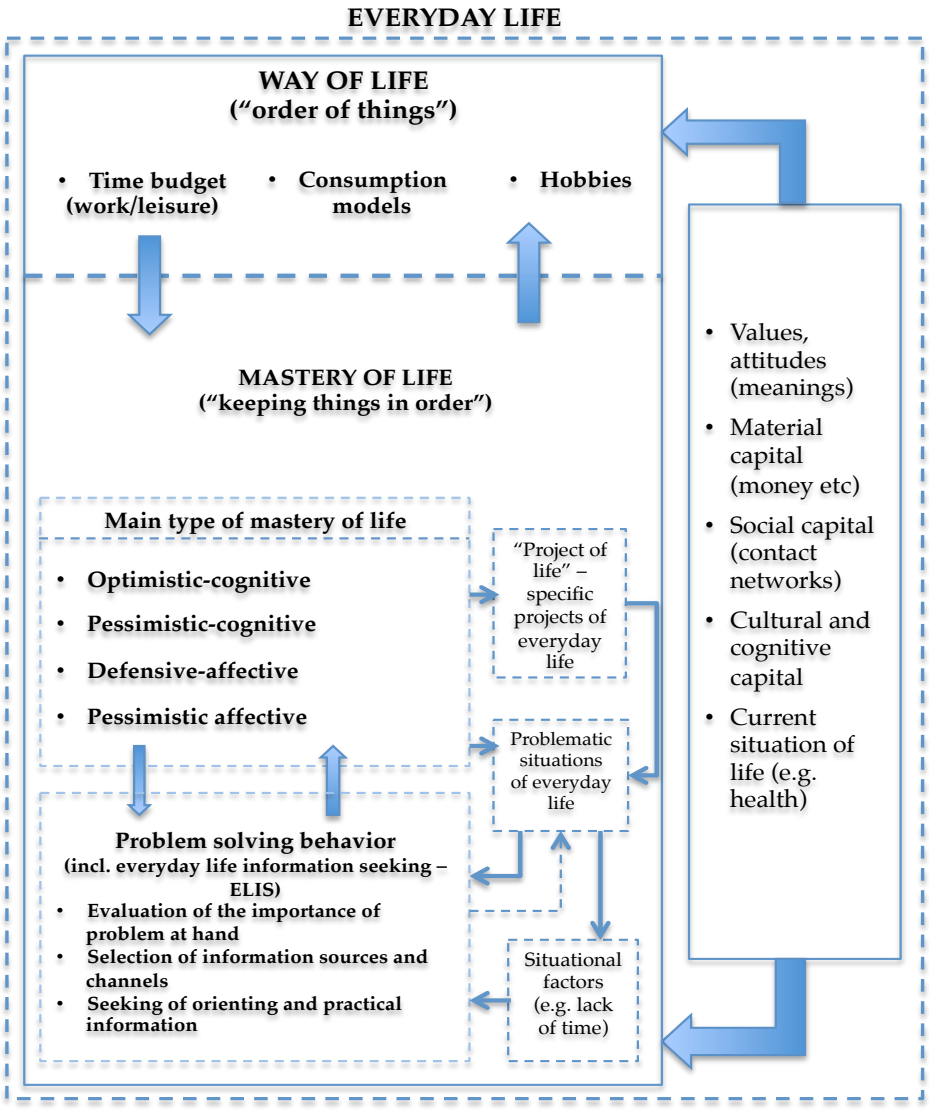



**Figure 2.4** **Savolainen's basic components of the study of ELIS in the Context of Way of Life**

Savolainen (1995, p. 268) recognized that this model would allow explanation of both the way people encounter and use information in everyday life, and how they solve problems not related to tasks that are part of their job. His research then tested a number of hypotheses put forward by the model: that sociocultural factors would significantly shape the order of things and mastery of life, and therefore influence information seeking practices associated with these two concepts. His studies sought to establish the value of the research framework (depicted in Figure 2.4) in the study of information seeking (1995). Specifically, he wanted to find out how sociocultural factors affected ELIS practices when individuals were faced with a specific problem, and whether there were differences between the way people seek orienting information (i.e. putting the problem into a context) and practical information (i.e. what to do about the problem).

In testing this model, Savolainen found an indirect relationship between way of life and information seeking in a problem-solving setting, which he attributed to the influence of mastery of life on problem-solving style. His interviews of two groups, teachers and factory workers, showed that teachers were more likely to be heavy users of newspapers and light users of electronic media such as radio and television, although some teachers appeared in the group of light users of newspapers and some workers were heavy users of newspaper. Industrial workers seemed to be more dependent on immediately available media information sources, which were not always the best for solving their problem and the better educated teachers tended to seek information more actively and widely (Savolainen 1995). The spread of media use was enough to lead him to consider problem-solving style a factor in the ELIS process. The four problem-solving styles that he used were listed earlier. Savolainen did not explain how the interviews explored which problem-solving group the subjects belonged to, but it seems that a subjective judgement by the interviewer was made in each case. He concluded that way of life based on social class undoubtedly affects practices of information seeking (both orienting and practical information), but that there were exceptions to the rule. So while generalisations could be made, the outliers needed to be recognised. This finding was similar to Warner et al.'s (1973), where general patterns of information seeking relating to education and income did not apply to a small group of individuals.

Savolainen's findings support those of a handful of researchers who argue that level of education can explain the use of a number and range of different sources information seeking (1995). Income and occupation has some influence on sources used (Parker & Paisley 1966; Warner, Murray & Palmour 1973). Gender has some effect on content preference (although this disappears with increased education levels); regard for sources

is important in the information seeking mix (Parker & Paisley 1966; Warner, Murray & Palmour 1973). Other people are a key source (Savolainen & Kari 2004). In addition, accessibility has a strong influence on sources used (Savolainen 1995).

From testing the model depicted in Figure 2.4, Savolainen (2008b) came away with several questions that were not answered by the framework. Firstly, he asked whether the framework could be refined to enable it to look more closely at the dominant styles of mastery of life. Secondly, he believed that situational factors and their influence as an information seeking trigger needed to be factored in more detail into the model. Thirdly, he wondered whether a refined version of the model could answer the question of whether information seeking could be analysed using situational factors or level of interest, and fourthly, he believed that any refinement to the model should include availability and accessibility of information.

### *2.2.2. Problem-specific information seeking*

Savolainanen's research (2008a) was concerned with the seeking of both orienting information and problem-specific information, which he said were closely intertwined, with both types of information often sought at the same time. He described orienting information seeking as a scanning activity that incorporated daily media habits and consultation of other sources of information as part of a routine (i.e. checking email, talking with work colleagues). Some of this activity was passive, such as listening to the radio or a conversation overheard, but even passive information seeking can turn into problem-specific information seeking if the receipt of certain information triggers a transition. At the same time, Savolainen (2008a) also considered the concept of source preferences - the preferred sources and what are the criteria for these preferences (2007b, 2008b). He attempted to map source preferences and source preference criteria, firstly dividing sources into zones according to their importance to the individual. He developed this concept of zones from Sonnenwald's (1999) idea that within every context and situation, there is an information horizon in which individuals conduct their information seeking (Savolainen 2007b, 2008a). Within this information horizon is the perceived information environment of the individual (Savolainen 1995), which was the range of sources the individual is aware of and has experience of using. From this, Savolainen developed a number of zones: Zone 1 was most strongly preferred information sources, Zone 2 information sources of secondary importance and Zone 3 peripheral information sources. In two studies, Savolainen (2008b, 2010) measured this by asking respondents to draw their information sources into a map of concentric circles that would identify the zone, with Zone 1 in the centre of the circle and working out to Zone 3 at the outside

(1999). Sources were classified into six groups – human sources, broadcast media, printed media (including newspapers, books, local leaflets etc.), networked sources (including email, mailing lists and the internet), organisational sources (such as public libraries, associations) and other sources (such as courses and the daily living environment) (2008a).

Source preference criteria in the context of seeking orienting information were conceptualised and tested in a study of 20 individuals active in environmental issues (Savolainen 2008a). In the further development of the framework for this disaster information seeking study, a number of source preference criteria emerged: availability and accessibility of information, content of information, usability of information (e.g. clear organization of the content), user characteristics (for example, media habits) and situational factors (such as lack of time). The way the source preference criteria fit with information source horizons for the environmental activist study is shown in Figure 2.5 below. The level of interest in an issue can guide source preference criteria, which can then influence which zone a type of source can fall into. The source preferences and the zones that sources fall into will depend on the topic and the level of interest at hand (Savolainen 2008a).

The main difference between this model and his first was that the first model included the four approaches to mastery of life – optimistic-cognitive, pessimistic-cognitive, defensive-affective and pessimistic-affective. This was omitted in the second version, with a concentration instead on the physical activity of seeking information and why certain pathways were chosen. The reasons for this were that these approaches to information seeking were concepts with "…large extensions and heterogenous intensions…" (2007b), whose complexity would make measurement difficult. Their existence highlighted the difficulty in specifying which parts of the ELIS model were affected by way of life, and which could be attributed to other factors (Savolainen 1995). This version of the model is shown in Figure 2.5.

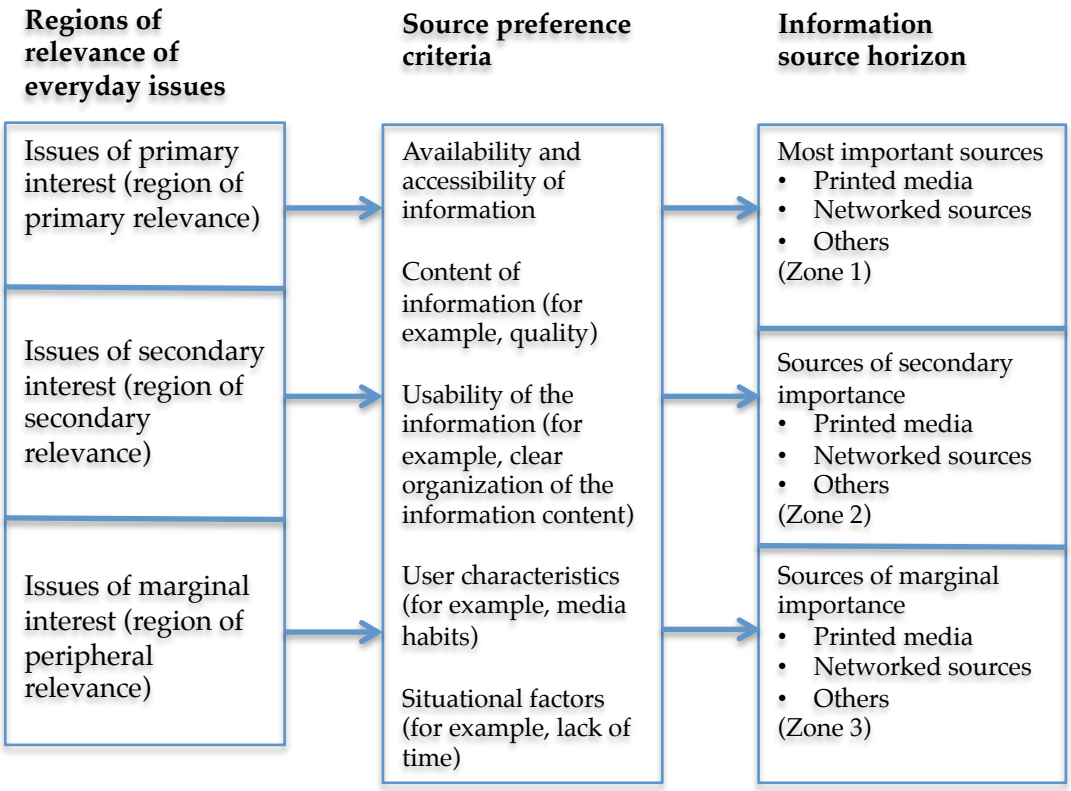



**Figure 2.5** **Information source horizons and source preferences in the context of seeking orienting information**

To test this model, Savolainen conducted an exploratory study of 20 environmental activists in Finland (2007b) using semi-structured interviews. Participants were asked to identify a topic on which they might look for information, and most selected environmental issues or Finnish politics. They were then asked to map their information sources in terms of importance, firstly drawing themselves onto the map and then plotting their information sources, with the most important sources plotted closest and the least important plotted furthest away. In this study, participants identified 15 discrete sources or forms that could be sorted into one of the six source types that Savolainen had developed in earlier research.

The distinction between sources and forms that occurred at this point (Savolainen 2007b) is important because it represents a point of ambiguity in the model in Figure 2.4. For instance, it was not clear if the researcher identified as a source the television station or the news presenter who appeared on this station. While Savolainen recognised the difference during this study, he did not subsequently separate the two concepts. In addition, while the classification of sources into groups is useful for simplifying the data received in a study and allowing generalisations to be made, it can also be a fault if the research is to be used for practical application. The source classifications were broad, so a

researcher could be faced with the scenario of having exactly the same source ranges within each zone. For instance, a person might identify a newspaper, a relative and the internet as his Zone 1 sources, and then a brochure, a friend and Facebook in Zone 2, with a book, a colleague and email messages in Zone 3. This would result in the range of sources (printed media, human sources and networked sources) appearing to be exactly the same for each zone. This would subsequently present difficulties for a researcher in drawing conclusions using the model as a base. If the research was to guide practice in providing information to a specific group, its findings would be ambiguous in terms of the specific information sources to use. In addition, Savolainen found that a particular information source, for instance a neighbor or a particular newspaper, could appear in all three zones, possibly because that source provided different types of information over the information seeking period, or the information changed in importance as the information seeker learned more.

Source preference criteria were also explored, with 116 individual source preference criteria emerging, although some were mentioned several times. The list that Savolainen (2007b, p. 1715) uncovered in information seeking research included 10 items:

- accuracy of information;
- ability to understand information;
- familiarity with the source;
- availability of the source;
- accessibility of the source;
- ease of use of the source;
- speed of use/access to the source;
- reliability of the source;
- trustworthiness of the source; and
- expense of the source.

These were classified by Savolainen (2007b, p. 1716) into five groups:

- availability and accessibility of information;
- content of information (e.g. reliability, depth of content);
- situational factors of information seeking (such as lack of time);
- usability of information sources and forms (e.g. easy to use, well-organised sections of the newspaper); and
- user characteristics (e.g. long-standing habit or unfamiliarity with a source).

Media habits seemed to have great influence across the zones (2007b), with all zones heavily featuring television (broadcast media) and newspapers (printed media), both easily accessible and part of everyday life for the participants. Both accessibility and availability were the most prominent preference criteria for sources in Zone 1, while content of information was important across all zones and the primary criterion above all other source preference criteria (2007b, 2008a). Situational factors had some significance in peripheral sources in Zone 3, but none in Zones 1 and 2. Usability and user characteristics had a relationship to sources in Zone 1, but remained surprisingly minor criteria (Savolainen 2007b).

Savolainen's next step was to refine and test the model on problem-specific situations, with a focus on source preference criteria (2008a). Information zones remained central to the model, and he also became more interested in the information pathways used by information seekers, which were closely related to information source preferences. Information pathways related to sequential information seeking activity over time (Johnson et al. 2006), which was the route someone followed in pursuit of answers to questions within an information field (2008a). Information pathways were added to the previous model exploring the relationship between information source horizons and source preference criteria (see Figure 2.5). The concepts were placed in a problem-specific context, which was thought to dictate the information needs of the individual (Harris & Dewdney 1994). The resulting model is illustrated in Figure 2.6.

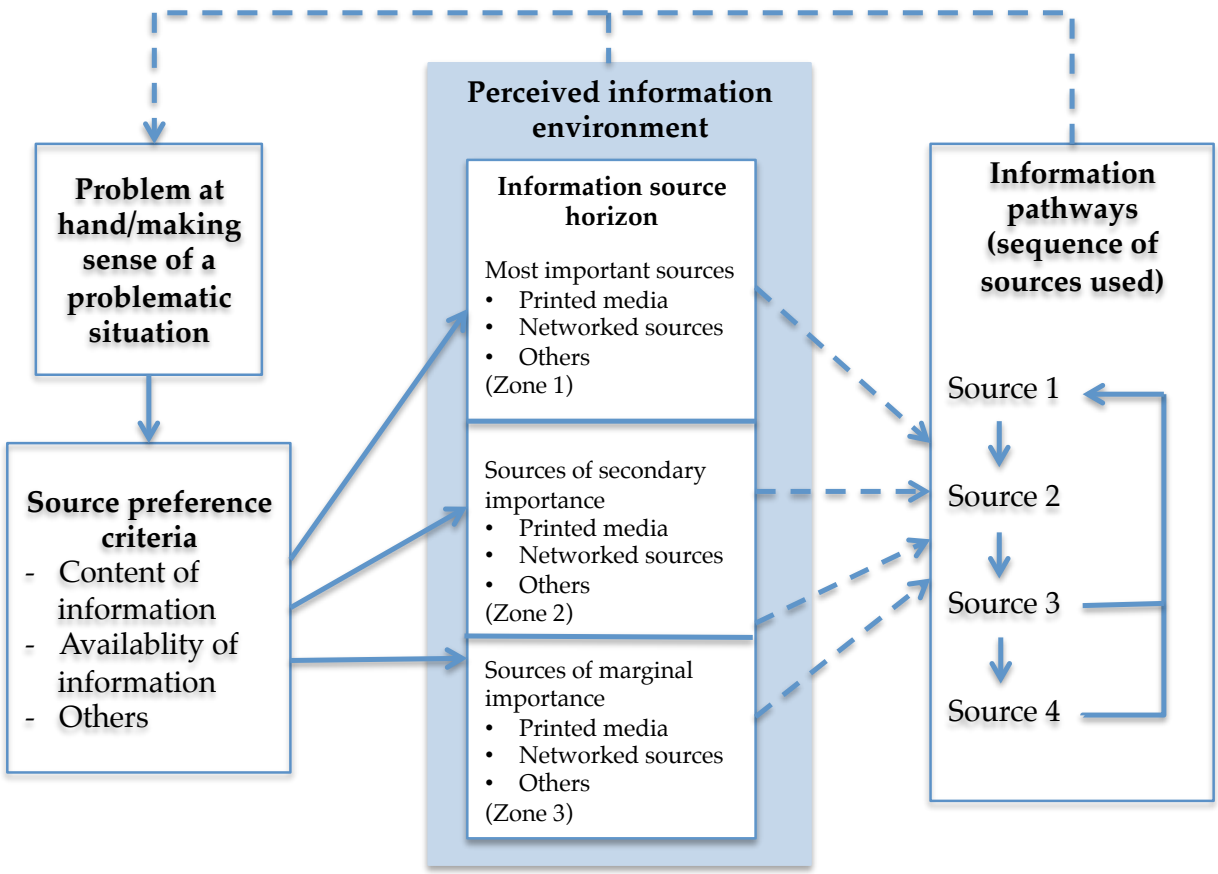



**Figure 2.6 Savolainen's information source horizon and information pathways in the context of problem-specific information**

In this model, realisation of a problem triggered the act of making sense of the problem, which incorporates the information seeking process. Source preference criteria filtered the sources used within the perceived information environment, and each source then fits into one of three zones: most important (Zone 1); of secondary importance (Zone 2); and of marginal importance (Zone 3). Using just three zones enabled simplification of the model (Savolainen 2008a). Built into this model was the sequence of sources (the information pathway) used by the individual, and a feedback loop from each source within this sequence. This feedback loop allowed the individual to return to the sensemaking stage after receiving information from one or more sources, or to return to a particular source that had been consulted early in the sequence for clarification or new information.

Data from four studies tested the model in a problem-specific context. The first study used the model in Figure 2.4, the initial framework, comparing information seeking behaviour of teachers and labourers in Finland (Savolainen 1995). A study of environmental activists tested the updated model in Figure 2.5. The data from this study added to a study of homebuyers tested the final version of the model represented in Figure 2.6. Human

sources (colleagues, friends and acquaintances) and networked sources (the internet, email and mailing lists) were the primary information sources for environmental activists (Savolainen 2008a), with networked sources strongly preferred in the home buyers' study followed by printed sources (Savolainen 2010). These and other sources were selected mainly on the basis of the content of the information in both studies (2008a). Availability and accessibility were of some importance in the environmental activists study, while usability of the information was the second source preference criteria amongst home buyers, but only for networked and printed sources - other source preference criteria in both studies were marginal. Information pathways for environmental activists consisted of between one and six information sources (average 3.5) (2010), while homebuyers consulted between three and 11 (average 5.7)(2008a). Savolainen concluded that in urgent cases, such as a health problem, organisational sources, such as a doctor, would be consulted first, but in less acute cases, preliminary information was sought from the internet. The results of these problem-specific studies reflected those of other studies that had used different models, including Harris and Dewdney (1995). In these, content of information and availability and accessibility were the two main reasons for use of a source, while the Savolainen studies emphasised content of information over availability and accessibility.

## 2.3. A model of information seeking in disaster

This section, which is Stage 3 of the literature review, will derive a disaster information seeking model from the two models considered so far. It will use the Mileti and colleagues' risk communication for natural hazards model 'characteristics' to demonstrate the influences on the information seeking pathway described by Savolainen's model. The explanation of the development process for this new disaster information seeking model will use Savolainen's model as a foundation. It will consider the problem at hand triggering an information seeking process, which is then filtered by source preference criteria to allow the individual to select sources and forms into zones of importance. From this point, it will describe the sequence of information seeking; and finally shows the action of the feedback loop to allow additional sensemaking through the process.

An illustration of where this section sits in the context of the rest of the literature review is provided over the page in Figure 2.7.

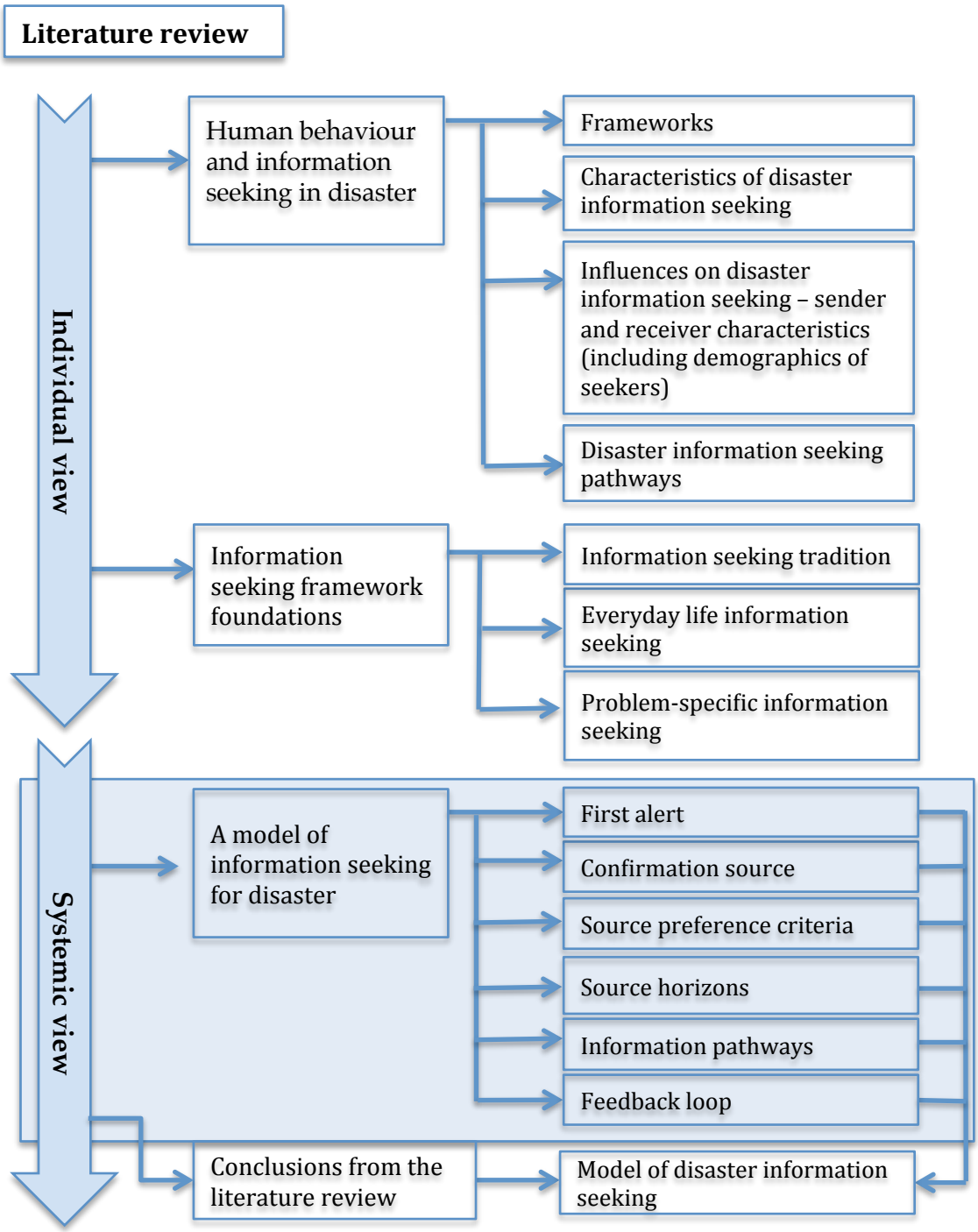



**Figure 2.7 A map of Chapter 2 – where you are in the literature review**

In comparing the risk communication for natural hazards and problem-specific information seeking models, it is evident that there are similarities in the belief of the designers that characteristics of the sources and forms, and the information seeker would have some influence on the amount of information seeking and its patterns. These influences now need direct comparison. Table 2.3 shows the characteristics put forward by each of the theorists.

**Table 2.3 Table of comparison of characteristics of sources, forms and information seekers**

| Mileti, O'Brien and Fitzpatrick | Savolainen |
|---|---|
| ***Sender characteristics*** | ***Source preference criteria – source/form*** |
| Source or form<br>Consistency<br>Certainty<br>Accuracy<br>Clarity<br>Sufficiency<br>Frequency<br>Guidance<br>Location | Accuracy of information<br>Availability of the source<br>Accessibility of the source<br>Ease of use of the source<br>Speed of use/access to the source<br>Reliability of the source |
| ***Receiver characteristics*** | ***Source preference criteria – information seeker*** |
| Environmental cues<br>Social setting<br>Social ties<br>Socio-demographics<br>Psychology<br>Pre-warning perceptions/experience | Ability to understand information<br>Familiarity with the source<br>Expense of the source<br>Trustworthiness of the source |

The characteristics of sender and receiver in each of the models are quite reflective of each other, although the sender communication perspective of the Mileti version becomes apparent compared with the information seeker orientation of the Savolainen model. While the influence of sender and receiver characteristics was central to Mileti and colleagues' model, in Savolainen's model, it is a filtering factor in a larger process. The models are presented here to show similarities and differences more clearly. The first model, Mileti, O'Brien and Fitzpatrick's risk communication for natural hazards should be viewed within the context of the behavioural process of hear – confirm – understand – believe – personalize – respond. This context shows a much closer relationship to the process that Savolainen's model measures. In addition, the sensemaking loop in the Savolainen model can indicate the feedback phenomenon that Mileti and O'Brien identified, where a person proceeds through the stages of the model each time new information is received and new questions are posed (Mileti & O'Brien 1992), continuing a looping information seeking process until the threat is diminished. Figure 2.8 presents a reminder of the two models that feature as a foundation for this thesis.

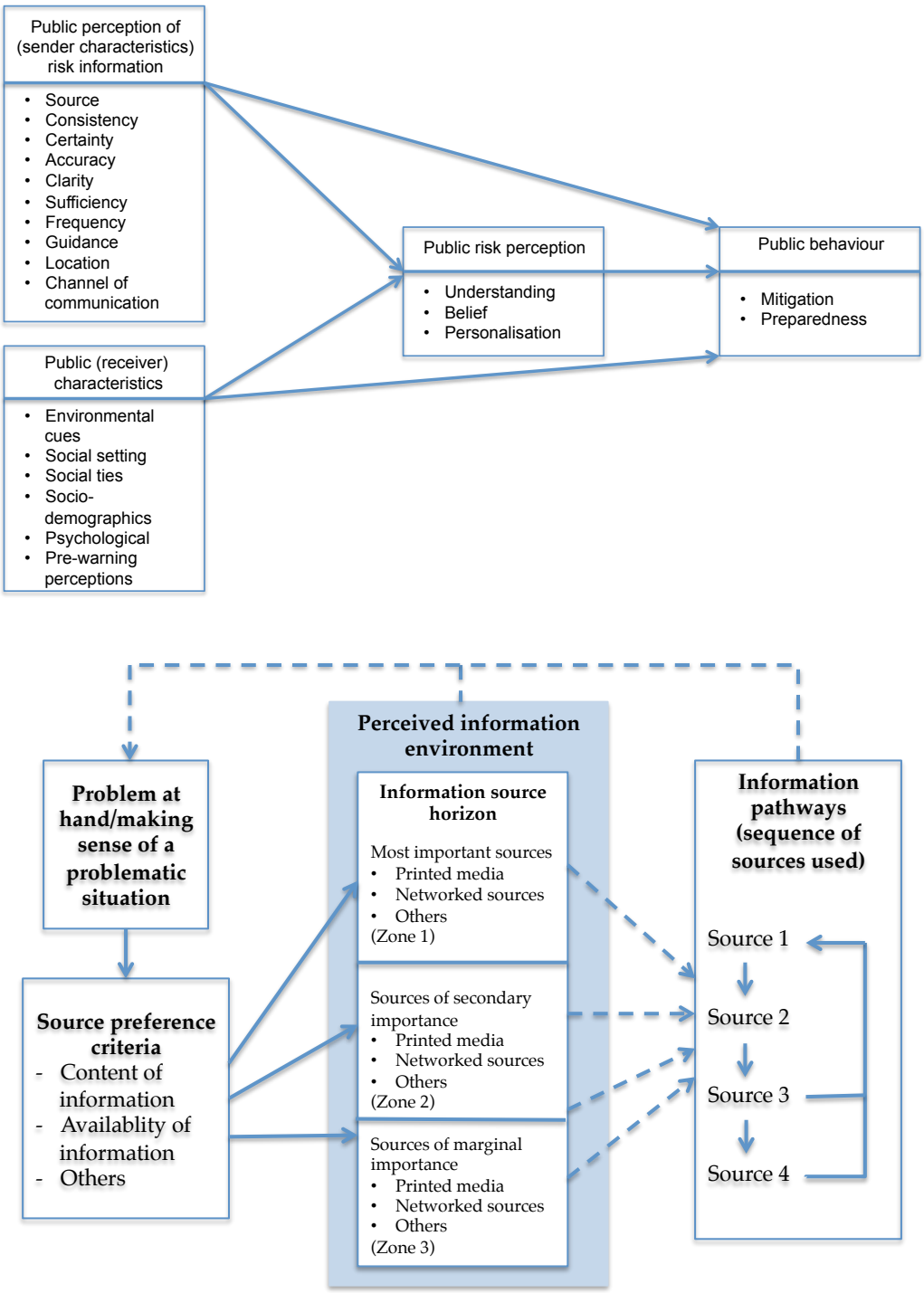



**Figure 2.8** **Mileti and colleagues' model of risk communication in natural hazards (top) compared with Savolainen's problem-specific information seeking model (bottom)**

Both models are missing a trigger point for the process of information seeking in a disaster. The literature review revealed that Mileti and colleagues' first step, hearing about the disaster, was triggered by a specific situation, and that the form or source of this alert was determined by the type of disaster the individual faced. Savolainen's model

considers the 'problem at hand', but there are no clues in either model as to how we might explain the individual receiving information that informed him or her that the specific situation was relevant to them. In addition, Savolainen's model, while not a tightly closed loop, shows a sense-making process with no place for the entry-level alert. In a disaster information seeking model, the first alert source will be an important inclusion, especially given the large body of research that measures how people first heard of a disaster. In illustrating the disaster information seeking model, **'the first alert'** will be a starting-point component that feeds into a loosely closed loop similar to Savolainen's.

Both Savolainen's research and the disaster information seeking literature have shown that different problems at hand produce different information seeking behaviours. Mileti's model appears to assume here that all natural hazards would produce the same nuances of behaviour, whereas the study under discussion here has shown there are differences in both behaviour and information seeking across natural hazard types. Mileti and colleagues' model does not provide a platform for consideration of the disaster type, but Savolainen's framework very clearly shows a place for this in the component 'problem at hand'. This will be included as the first filter in the disaster information seeking model for subsequent information seeking behaviour and will appear as **'problem at hand – disaster type'**.

One of the contrasts between the two models was the way they classified the possible influences on the individual's information seeking behaviour. Mileti and colleagues' presented a comprehensive list of characteristics that covered both overt and more intangible factors that might affect behaviour (the comparisons are evident in Table 2.3, presented earlier). Savolainen's source preference criteria related mainly to the source and form, whereas Mileti, O'Brien and Fitzpatrick effectively included factors that allowed consideration of psychological and social factors. Another difference was that Savolainen used source 'accessibility' and 'availability' to place the information seeker at the start of the process, while Mileti's model is more focused on the sender as the start of the process. Savolainen's source preference criteria of 'reliability', while it could be covered by the sender characteristics that Mileti et al. have used, also has an information seeker perspective. Adding the features of 'accessibility', 'availability' and 'reliability' to Mileti and colleagues' list of sender characteristics and using this list as the determinants of the source preference criteria in the disaster information seeking model could solve this inconsistency. Looking at Savolainen's other source preference criteria, 'accuracy' is included already in the Mileti, Sorensen, O'Brien and Fitzpatrick's list, while 'ease and speed of use' and 'reliability' would be incorporated as sub-characteristics of the sender characteristic, source/form, as they are features controlled by

the form itself and not outside factors such as availability of electricity, access to facilities by evacuees, or working transmission towers. These outside factors could affect 'availability' and 'accessibility', which is the reason for separating these characteristics from the source/form itself.

Working further through the list of influences presented by both theorists, the ability of the individual to understand information is a cognitive ability, which appears as a psychological characteristic. Familiarity with the source or form could be explained by experience. Expense of the source or form would depend on the resources available, a social-demographic characteristic. Trustworthiness of the source/form is well established before a disaster and would therefore be included as a pre-warning perception characteristic. The descriptors of the factors that influence information seeking in a disaster are also indicative of their perspective. Mileti's 'sender characteristics' does not denote a seamless process between the information seeker and his or her selection and use of the source/form. Savolainen's 'source preference criteria', however, shows a direct connection between the information seeker and the selection, without the necessity of an extra layer of explanation to connect the two.

From this discussion, we emerge with a number of secondary filters (primary being disaster type), by which an individual's selection of information sources is guided. This **'source preference criteria'** component will be included in the disaster information seeking model, connected to the disaster type filter and illustrating the cognitive processes that connect the first alert to the information seeking process.

At this point in the information seeking process, the two models diverge slightly. Mileti et al.'s framework considers the confirmation process generally, while Savolainen's examines the specifics of the confirmation stage as well as ongoing information seeking. He has done this in his representation of the information source horizons in which sources and forms are placed into three zones in terms of their importance – most, of secondary and marginal importance. His exploration of the specifics of information seeking behaviour continues into examination of the sequence of sources. Both of these components, **'information source horizons'** and **'sequence of sources used'** are central to the ability of this study to answer two of the research questions. These two research questions are:

a) *Can information models, which are well established theory, be used to describe how people look for information during the impact phase of a disaster?*
b) *What information seeking patterns emerge from the impact phase of a disaster?*

One key advantage of the two models was its ability to explain a return by information seekers to sources and forms that had already been used in the information seeking pathway. This helped account for the tendency for disaster situations to throw up new challenges for individuals, requiring changes to information seeking pathways and in some cases revisiting a pathway already travelled. To achieve this in everyday life information seeking, Savolainen had included a feedback loop, which permitted the information seeker to return to a previously visited source or form based on information received that might trigger such a return. He called this 'additional/revised sense-making based on information received in the search'. Mileti and O'Brien also identified this activity in a disaster situation. In the disaster information seeking model, it will be called **'the feedback loop',** with Savolainen's title used to explain this component.

The diagram below is a revised model of information seeking behaviour based on the earlier review of the disaster literature in Section 2.1. The model will provide an explanatory framework for information seeking in a disaster. An illustration of the model is provided in Figure 2.9, and it includes all of the components detailed earlier in this section.

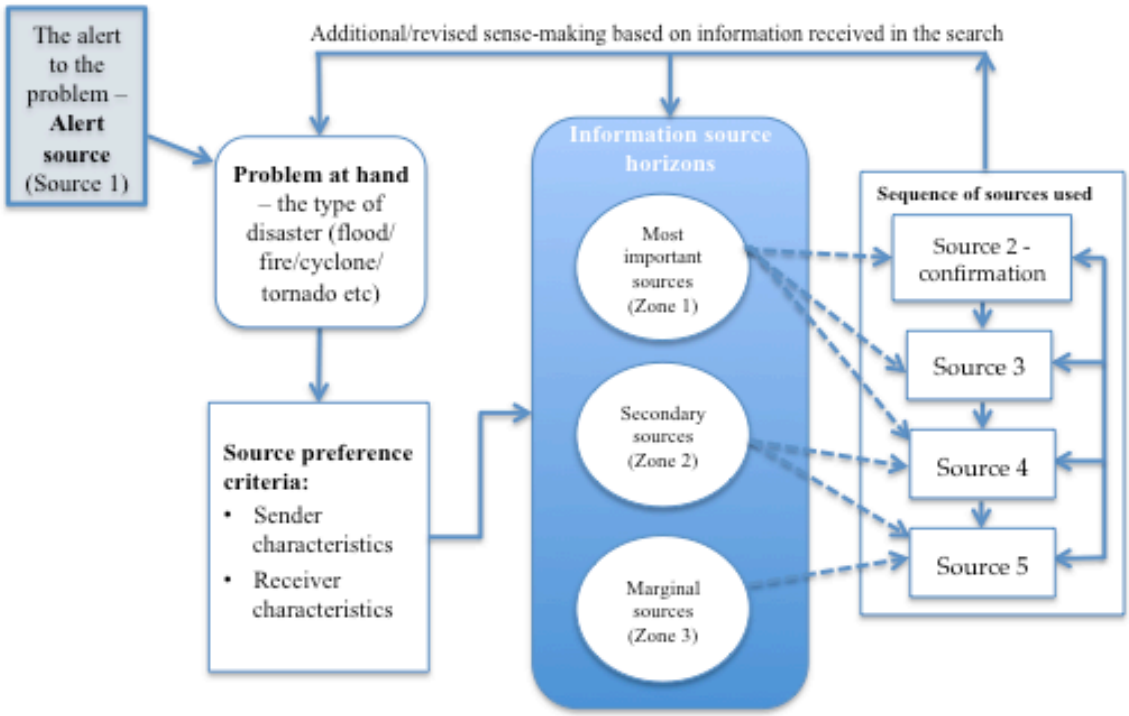



**Figure 2.9 Proposed model of disaster information seeking**

In summary, this model includes the features described earlier:

1. The first alert, which is situated outside the feedback loop;
2. A 'problem at hand' that is a specific type of disaster;
3. Source preference criteria sorted into sender and receiver factors;
4. A place to sort information sources and forms in terms of their value to the information seeker (information source horizons);
5. A component to sort order in which information seekers use different sources; then
6. A feedback loop to allow a return to previously considered sources and forms to refine or renew the search for information.

The next step will be to undertake research to build on this model. The research will identify information seeking patterns in a disaster situation that can then be compared with the process that is outlined by the model. The research will result in improvements to the model that will allow it to better explain information seeking behaviour in a disaster situation.

## 2.4. Summary of the literature review

This chapter has shown that information seeking is an important component of the individual's reaction to his or her involvement in a disaster (Mileti & Fitzpatrick 1992; Mileti & O'Brien 1992). This section will summarise the key findings. Figure 2.10 below illustrates the progress made through the chapter and the literature survey.

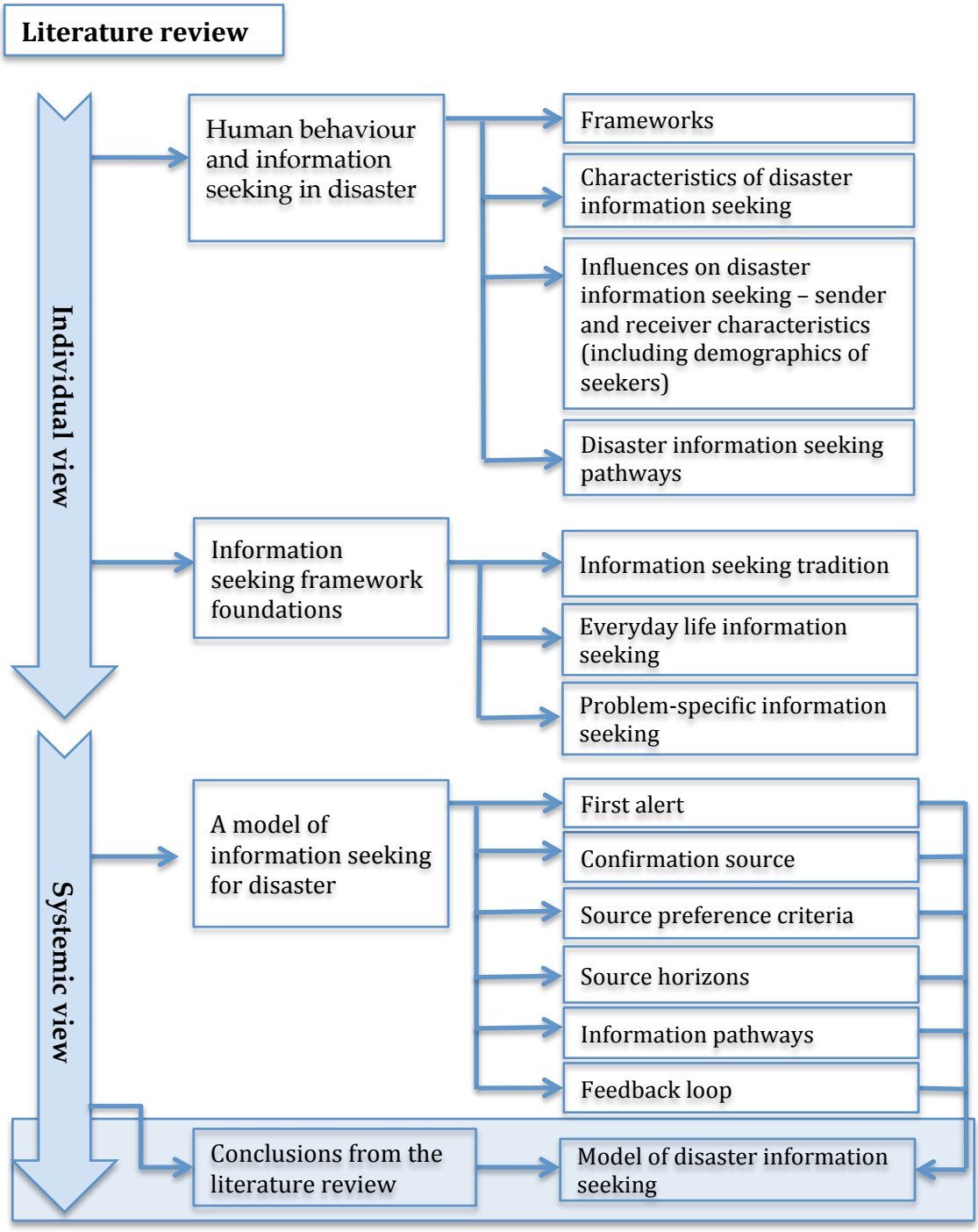



**Figure 2.10 A map of Chapter 2 – where you are in the literature review**

Mileti , Fitzpatrick and O'Brien proposed a series of actions that include information seeking: hear, confirm, personalise, determine whether protective action is needed, determine whether protective action is feasible, and take action. A series of factors related to sender/source/form and the information seeker have potential to influence information seeking behaviour in a disaster. For the sender these are the source/form used and its accessibility and availability; the consistency, certainty, accuracy, clarity and frequency of the message; sufficiency of information; guidance by the sender; and location of the disaster. For the receiver, they are environmental cues, social setting, social ties, socio-demographics, psychological factors and pre-warning perceptions and previous experience.

A range of alert sources appear in the disaster literature and many seem to be connected with the type of disaster that is occurring, such as sirens and television for tornadoes, television or radio for flooding or cyclone, social networks and family for sudden events such as flash flood, bushfire or a terrorist event. In confirming the disaster and its implications for the individual, a person will then turn to television or specific websites on the internet for many disaster types, unless they are young, in which case they might use social media to access information from friends, or in a bushfire in Australia, in which case radio is more popular. The internet is an increasingly important medium for all age groups, but only a few studies have explored specific sources on the web.

The literature review revealed a number of factors that may influence the information seeking process during a disaster. Table 2.4 summarises the key points that emerged.

**Table 2.4 Conclusions on the factors that influence disaster behaviour and information seeking**

| Characteristic | Effect |
|---|---|
| **Message features – source and form** | • The source of the information will effect decisions to evacuate and the speed of the evacuation, with agencies more effective as a source<br>• The level of trust in the source affects action, and disaster type has been found to affect the level of trust in a source in the United States<br>• Multiple forms have greater effect on behaviour in a disaster<br>• The type of form used can affect action<br>• The type of disaster seems to affect the form that messages travel by |
| **Message features – consistency, accuracy, clarity, certainty, guidance, frequency** | • Multiple messages can cause inconsistency / conflicting information, which causes delays in action while people check facts<br>• Consistency can also be affected by the language used – local terms and expressions need to be used<br>• Simplicity of messages can affect comprehension and then action<br>• Specific details provide certainty, which can prompt action to occur more quickly<br>• Specific details can help people make decisions on protective action<br>• Maps in flood and fire help people reach evacuation decisions and take action more quickly<br>• Details of timing, severity, evacuation centres and safe routes prompt action and avoids people making flawed assumptions or filling the void with rumours<br>• Message frequency across multiple forms is effective at prompting action in western cultures. It seems to reduce the instance of cognitive dissonance |
| **Environmental cues** | • Seeing smoke, water, or prolonged rain is an effective prompt for people to take action and is a trusted source<br>• Sirens are an important alert for tornadoes<br>• Environmental cues contribute to sensemaking<br>• Environmental cues are related to proximity to the disaster |
| **Social setting and social ties** | • Family and household members and neighbours can provide information and influence action<br>• People with strong community connections are more likely to have prepared for a disaster and will take action more quickly<br>• Families with children will evacuate earlier than others, but will wait until they are reunited before taking protective action |

| Characteristic | Effect |
|---|---|
| | • Families with children are less likely to have taken any preparation actions<br>• Family and neighbours are a predominant source of alerts<br>• There are differences in information seeking activity and general disaster behaviour between single households and families<br>• Neighbours are an important confirmation source<br>• Social ties outside a day to day social network can be used during a disaster as a source of information<br>• Agency contacts are an important confirmation source |
| **Proximity and location** | • People closer to the impact zone are more likely to use environmental cues as a source of information<br>• People closer to the disaster impact zone will seek different information to those further away<br>• Rural and city residents have used different sources of information in at least one previous study |
| **Household composition and dependents** | • The relationship between having a dependent in a household and information seeking does not seem to have been explored<br>• Family and neighbours (other people) are a predominant source of alerts<br>• Family and neighbours can influence post-information decision making<br>• Household structure influences the source and form of alerts and subsequent information<br>• Disabled people will seek different information to those who are not disabled |
| **Age** | • Young people will prefer new technology as their form, and friends as their source<br>• Most people will use television as a key medium<br>• Television weather forecasters are a trusted source for most age groups<br>• Internet is an increasingly important medium for most age groups |
| **Gender** | • While women engage in higher levels of information seeking and regard some sources as more important than men do, men and women use much the same information forms and sources in a disaster<br>• Men are more likely to seek visual confirmation once they learn about a disaster<br>• Social networks are important sources of information for women in a disaster or crisis<br>• Gender influence on information seeking may have mediating factors such as education, household composition, experience and resources |

| Characteristic | Effect |
|---|---|
| **Education** | • Level of education may have some effect on first source, but previous studies have not been emphatic<br>• People with lower levels of education might use personal contacts more often as part of their information seeking behaviour<br>• Other variables may be indicated in results that show effect of education on action |
| **Race and ethnicity** | • As with gender, there may be effects of other variables on race and ethnicity such as location, income, education and gender itself<br>• Studies of the influence of race in disaster and disaster information seeking behaviour have predominantly been undertaken in the United States<br>• In that country, there are differences in information seeking between whites, Asians, Latinos and African-Americans.<br>• Television is the main source for whites, Hispanics and African-Americans in the United States, with differences between groups on the levels of usage<br>• Other people are another key source for all groups, but more important for Asians than other groups |
| **Resources** | • Researchers have secured mixed results in determining whether income has an effect on behaviour in a disaster<br>• Income as a variable needs to be mediated for other factors such as household composition, age, disability, education and gender |
| **Cognitive abilities** | • If acting on warnings is difficult because of circumstances, people will dismiss warnings<br>• Lack of information will delay action; for example, scant information about an evacuation location will lead to delays in evacuation<br>• Cognitive abilities and process explain why past experience will determine whether people are hypersensitive of dismissive of warnings<br>• This factor explains why women will take shelter in a tornado before men |
| **Experience** | • Experience with a certain type of disaster will guide protective behaviour and information seeking if that disaster happens again<br>• Past experience will cut the time taken for people to complete the confirmation stage of the disaster behaviour process<br>• No experience with a disaster can disrupt the ability of people to process warnings because it is outside their frame of reference (such as the World Trade Center attacks) and delay information seeking and action<br>• Recent experience affects where people look for |

| Characteristic | Effect |
|---|---|
| | information and their information behaviour patterns<br>• In most disaster types, experience in a certain type of disaster will help communities prepare for and react to a recurrence of that disaster but it appears this may not apply in hurricanes and tornadoes or for a disaster that community has not experienced before<br>• Lack of experience may result in increased information seeking at the impact stage which could be measured in terms of the number of sources, or the number of times sources are accessed |
| **Locus of control** | • People who believe they have more control over life will engage in more information seeking and protective action than those who believe that control lies with others or outside (e.g. government or a deity) |

All of these factors reflect the receiver and sender characteristics identified by Mileti, Fitzpatrick and O'Brien, and Savolainen's characteristics of the media and the individual, and situational factors of the individual. In Savolainen's case, these then informed the selection by the individual of sources, which he described as source preference criteria (as in Parker & Paisley 1966; Savolainen & Kari 2004; Warner, Murray & Palmour 1973).

However, while the Mileti and colleagues' model for risk communication was useful and has provided a solid foundation for the chapter, the literature review revealed the lack of a model specifically for information seeking in the impact phase of a disaster. For this study, Savolainen's model of problem specific everyday life information seeking was adopted from the general information seeking literature, and the literature was used to make several small modifications in order to develop a model that might explain disaster information seeking. These modifications included:

- placing more emphasis on the first alert as a trigger;
- placing the first alert outside the feedback loop so that it played a role in the information seeking process only once;
- following the evidence presented by many researchers to support incorporation of situational factors such as demographics into the model as an influence on source preference criteria; and
- separating forms and sources, which were one and the same in Savolainen's model.

By extending Savolainen's problem-specific model, the model for disaster information seeking was developed, which included each of these extra features that related to disaster information seeking.

This chapter developed a model for disaster information seeking. The following four chapters, will describe the use of the disaster information seeking model as a framework for each phase of the research, and the refinement of the model at each step. The next chapter, Chapter 3 will describe the research approach and methodology used in this thesis. Chapter 4 will provide more detail on the first phase of the research, which was a set of interviews with disaster-affected people in four Australian communities, and will show how the interview results were used to further develop the model. Chapter 5 will describe a survey that was aimed at further amending the model. Chapter 6 will describe the design and results of a focus group that was undertaken to determine the model's practicality for emergency managers.

# 3. Research methodology and design

The previous chapter reviewed past research on information seeking behaviour in a disaster, and supported development of a disaster information seeking model. This model was based on the risk communication for natural hazards model developed by Mileti, O'Brien and Fitzpatrick (Mileti & Fitzpatrick 1992; Mileti & O'Brien 1992), and Savolainen's information seeking model (2008b, 2008a, 2010). This chapter details the research methods to be used to determine whether this model is appropriate to describe information seeking in a disaster situation. This chapter develops foundations for the set of studies undertaken for this thesis – the research paradigm and its ontology and epistemology are explained and the effect of the research paradigm on the format of the three stages of research explained. Then it describes the three phases of research undertaken – semi structured interviews, a survey and a focus group - detailing the design, and implementation of each method. Figure 3.1 charts this approach:

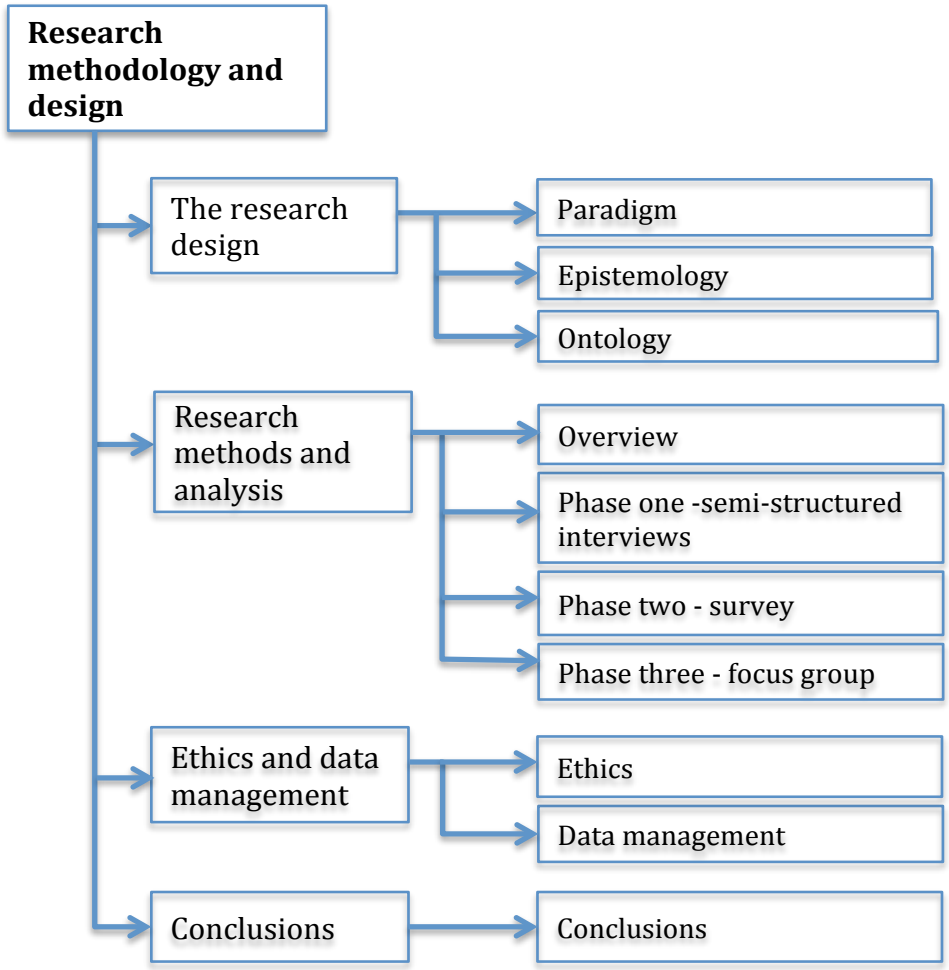



**Figure 3.1 A map of Chapter 3 – the research methodology and design**

## 3.1. The research design

### *3.1.1. The research paradigm*

The aim of this thesis is to establish whether the proposed model, shown in Figure 2.9 in Chapter 2, explains how people look for information when their community is in a disaster. Of the theories associated with disaster behavior research, the risk communication model put forward by Mileti, O'Brien and Fitzpatrick (Mileti 1995; Mileti & Fitzpatrick 1992; Mileti & O'Brien 1992) was the only one that attempted to explain information receipt and processing in a disaster. Savolainen's problem-specific information seeking model, coming from information behaviour research, better explained the information seeking process from an individual's perspective. It too, had shortcomings, explained in Chapter 2, which prevented it from explaining disaster information seeking effectively. Both models were used as a foundation for this study, but selection of a paradigm is now necessary before a research methodology is selected.

A paradigm is a set of beliefs that guides action (Guba 1990) and is an overarching concept in the hierarchy of theories that highlights the connection between the research at hand and the purposes and beliefs of the researcher (Case 2008). This "cluster of beliefs and dictates" influence what should be studied, how the research should be done and how the results should be interpreted (Bryman 2001, p. 446). A paradigm offers a framework for an accepted set of theories, methods and ways of defining data in a research domain, and a certain paradigm might become dominant in a domain because it can account for empirical reality in that domain (Lindlof 1995).

Two distinct paradigm groups have traditionally governed research design (Tashakkori & Teddlie 1998, 2003): the scientific method, which included empiricist positivism; and the more phenomenological approaches to discovery. Since World War II, a number of new paradigms emerged from social scientists' dissatisfaction with the positivist approach, including postpositivism, critical theory, constructivism, naturalism and pragmatism.

#### 3.1.1.1. Positivism

Positivism is an approach to research that measures what can clearly be seen and is absolute (Guba & Lincoln ; Tashakkori & Teddlie 1998). It was an approach developed to guide research in the physical sciences. Positivists reject the idea that data can be interpreted in terms of time, context and understanding of reality (Guba & Lincoln 1994), and believe that if generalisations cannot be made, then research should not be undertaken and the data should not be considered (Werner Heisenberg, cited in Sheridan

2014). Positivist philosophy also asserts that findings must be able to be codified into testable theories; results are independent of the investigator; results are cumulative, but should always be open to be disproved; and that knowledge can be unified (Sheridan 2014).

A number of axioms guide the positivist way of thinking. The ontology of positivism is the belief that there is a single reality that applies in any circumstance (Tashakkori & Teddlie 1998), that reality is "apprehendable" and tends to be reductionist and deterministic (Guba & Lincoln 1994). Its epistemology is dualist and objectivist (Guba & Lincoln 1994), maintaining that the researcher is independent of the results and the results are independent of the researcher (Tashakkori & Teddlie 1998). Influence in either direction threatens the validity of the research, so the researcher must enact a number of strategies to reduce the chance of influence tainting the results (Guba & Lincoln 1994). Positivists believe that research emphasis should be on arguing from the general to the particular, and that there are real causes that occur before or simultaneously with effects (Tashakkori & Teddlie 1998). The methodologies used by positivists always verify or disprove a hypothesis, are experimental or manipulative, and are generally quantitative (Guba & Lincoln 1994).

#### 3.1.1.2. Postpositivism

Postpositivism emerged in the 1950s and quickly gained recognition among the social science community as a reaction to the physical science focus of positivism (Tashakkori & Teddlie 1998). Ontologically, this view positions reality as imperfectly and probabilistically apprehendable, where reality is assumed to exist, but will be flawed because of our constructed understanding of reality and also human interaction with the phenomena being measured (Guba & Lincoln 1994). The effect of investigators on the phenomena being measured became known by postpositivists as the experimenter effect (Tashakkori & Teddlie 1998). This idea of value-laden enquiry, as well as theory-laden facts, are central to the approach used by postpositivists (Guba & Lincoln 1994; Tashakkori & Teddlie 1998). This approach is labeled critical realism because claims and beliefs about reality need to be critically examined, with the final result never being perfect (Guba & Lincoln 1994). While postpositivism attempts to retain the objective approach of positivism, dualism is abandoned and researchers using this approach accept that objectivity is a "regulatory ideal" and all attempts should be made to achieve this state (Guba & Lincoln 1994).

The methodologies used by postpositivists place emphasis on experimental design and triangulation as a way of falsifying, rather than testing, hypothesis. Inquiry is conducted in more natural settings, which allows collection of information on context and made more of the effort to determine meanings in human behaviour. To do this, more use is made of qualitative methods of research, but methods are still mainly quantitative (Tashakkori & Teddlie 2003).

#### 3.1.1.3. Critical realism

Critical realism was the first of a number of paradigms to emerge that supported the belief that reality in social science is shaped by social, political, cultural, economic, ethnic and gender factors. It was associated with postpositivism, but developed for evaluation research and mixed methods research for studies of human behaviour (Sayer 2000). The key tenet of critical realism is that the world exists independently of our knowledge of it, and that science should not be about identification of a coincidence between two variables. Instead, it should be an ongoing process where researchers improve the concepts used to understand the mechanisms that they study – the natural world does not change because the scientist's view of the world changes (Sayer 2000). The epistemology of critical realism is transactional and subjectivist (Guba & Lincoln 1994) – the investigator and the investigated object are interactively linked, with the investigator always influencing the results of the study. Critical realists believe the process cannot be objective, and accept the possibility of valid accounts of any phenomenon (Maxwell 2012). It tends to fuse ontology and epistemology with its view that what can be known is inextricable from the relationship between the investigator and a particular object or group under study. Critical realism asks three key questions:

1) What does the existence of the object/practice pre-suppose?
2) Can A exist without B? and
3) What is it about this object that enables it to do certain things? (Sayer 2000).

It attempts to answer these questions within the domains of the real, the actual and the empirical (International Centre for Critical Realism nd). The methodology that critical realists use are dialectical or dialogic, including surveys, ethnographic observations, in-depth interviews, family histories, analysis of discourse, and reviews of documents and secondary data.

### 3.1.1.4. Constructivism and social constructivism

In finding an alternative to positivism, three other, more radical approaches became increasingly popular – constructivism, interpretivism and naturalism – and of these three, constructivism has been the most prevalent (Tashakkori & Teddlie 1998). This general philosophy has also been applied to the sociology of knowledge to form social constructivism.

Constructivism is a relativist approach in which reality is assumed to be constructed by the investigator or knower, who interprets it based on perceptions and past experiences. Based on this, interpretation of knowledge is personal and individualistic (Jonassen 1991). Interpretations are also local and specific in nature but can be shared across groups and cultures (Guba & Lincoln 1994). Epistemologically, the investigator and the subject are not separable, and the results of the investigation will always show interactive links between the two. Investigation results are "literally created as the investigation proceeds" (Guba & Lincoln 1994, p. 111). Constructivists use hermeneutical and dialectical research methods, often inductively, in order to generate a theory or a pattern of meanings (Mackenzie & Knipe 2006). This inductive logic is key to understanding the discovery approach of constructivists (Tashakkori & Teddlie 1998). The methods used to do this are usually qualitative, such as interviews, observations, document analysis and visual data analysis, but can also include quantitative methods such as surveys. Quantitative data is used to expand on qualitative data and deepens the resulting description (Mackenzie & Knipe 2006).

Social constructivism embeds constructivism into a social reality that needs to be explored in order to produce social knowledge, which contributes to construction of a rationally organised society (Bourdieu 1984). Social constructivism describes the process of social interaction, interpretation and understanding in the production of knowledge (Vygotsky, cited in Adams 2006) and it is collaboration during these activities that makes social constructivism different from constructivism. Differences also occur in the research approach – constructivists place the emphasis on discovery and the interpretation of the investigator, while social constructivists emphasise the effects of language and culture and other situational factors on both the interpretations of the investigator and the participants. However, the inductive approach that is linked to discovery in constructionism, also applies to the collaboration, language and culture emphasis of social constructivists. Research methods are the same as those used by constructivists, but results are interpreted and reported through the language and culture lens (Mackenzie & Knipe 2006). Social constructivism is a research approach commonly used in

communication studies. The social phenomenological approach used by social constructivists strongly influenced Savolainen in the construction of his model of Everyday Life Information Seeking (Talja, Tuominen & Savolainen 2005), which provided a foundation for the disaster information seeking model outlined in Chapter 2.

#### 3.1.1.5. Pragmatism

Pragmatists accept an external reality and endorse 'fallibilism', the acceptance that research conclusions are rarely perfect or absolute. One of the factors underlying this is the allowance by pragmatists of consideration of human nature and other factors' effects on human behaviour (Johnson & Onwuegbuzie 2004). It is rooted in commonsense and is oriented to solving practical, real world problems by focusing on the problem to be solved and the consequences of the research, rather than determining first what methods to use (Feilzer 2010; Hall 2012; Mackenzie & Knipe 2006). This is in contrast to most other paradigms, which are focused on finding the truth or reality. The aim of pragmatists is to use the research method that best suits the question, theory or phenomenon (Feilzer 2010). The epistemology of pragmatism is both objective and subjective, depending on the question, theory or phenomenon under study (Tashakkori & Teddlie 1998) – in other words, any method that leads to solutions to a problem is acceptable.

Pragmatists embrace any research method that has potential to solve the problem at hand, and so the paradigm has become popular to guide mixed methods research. Methods include interviews, focus groups, observations, testing or experiments, and surveys. The variety of acceptable methods allows researchers to address different layers of a problem (Mackenzie & Knipe 2006).

#### 3.1.1.6. Paradigm summary

Five key paradigms have been considered for use as a foundation for this research. Table 3.1 provides a summary of their perspectives. Much of this table has been taken from Tashakkori and Teddlie (1998, p. 23), with critical realism added with contributions from Sayer (2000), Maxwell (2012) and Guba (1994).

**Table 3.1 Comparisons of well known paradigms**

| Paradigm | Positivism | Postpositivism | Critical realism | Social constructionism | Pragmatism |
|---|---|---|---|---|---|
| **Methods** | Quantitative | Mostly quantitative | Qualitative and quantitative | Qualitative/some quantitative | Quantitative and qualitative |
| **Logic** | Deductive | Primarily deductive | Inductive, deductive, adductive | Inductive | Inductive and deductive |
| **Epistemology** | Objective point of view. Knower and known are dualism | Modified dualism. Findings probably objectively true | Subjective (objective is impossible), accept alternative valid accounts of any phenomenon | Subjective point of view embedded in cultural context. Many constructions are possible | Both objective and subjective |
| **Axoiology** | Inquiry is value-free | Inquiry involves values, but they can be controlled | Values play a large role in interpreting results | Inquiry is value-bound; but values change continuously | Values play a large role in interpreting results |
| **Ontology** | Naïve realism | Critical or transcendental realism | Only one reality, but there are many valid descriptions of that reality from different perspectives | Relativism. With changing values, reality changes. Changes in reality can be prompted by results of research | Accept an external reality. Choose explanations that best produce desired outcomes |
| **Causal linkages** | Real causes temporally precedent to or simultaneous with effects | There are lawful, reasonably stable relationships among social phenomena. These may be known imperfectly. Causes are identifiable in a probabilistic sense that changes over time | Causality is a real phenomenon but relationship is not enough to establish cause and effect | All entities simultaneously shaping each other. It's not possible to distinguish causes from effects | There may be causal relationships, but we will never be able to pin them down |

The earlier discussion and resulting table helps narrow down the choices of paradigm for this present study, which will use mixed methods to consider a model for disaster information seeking. This rules out positivism and postpositivism, which focus on deductive processes rather than the inductive approach to be used here. Objectivism will not be possible on both the part of the researcher and the participants, given that this study explores human behaviour in a situation that is subject to higher than normal pressure and relevance to participants. In addition, the research will not 'solve a problem', but instead attempt to explain a phenomenon. Both of these aspects of the study will rule out pragmatism, which uses both objective and subjective approaches, and attempts to solve real world problems.

The two paradigms left for consideration are critical realism and social constructivism. Each would serve this study well. However, the literature review indicated that communication and information technology has changed dramatically since the 1960s and is still rapidly changing, indicating that the reality in which this model is situated is also changing. For instance, disaster researchers looking at information sources before about 2000 on disaster media consumption were focused on television, radio and newspaper (Piotrowski & Armstrong 1998; Quarantelli 1989b). In 2016, this had expanded to agency websites, news websites, weather websites, agency and other social media (for example, Facebook, Twitter, Instagram, Ushahidi, MySpace, specialist agency apps, Pinterest). Social constructivism's recognition of this type of change within the reality, plus its accommodation of an inductive approach, makes it the preferred paradigm for this thesis. A graphic representation of the location of the methodology for this research is presented in Figure 3.2:

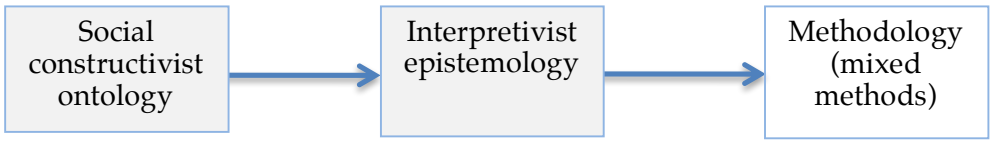



**Figure 3.2 The social constructivist approach**

### *3.1.2. Social constructivist ontology*

The paradigm supporting this research is social constructivism, for a number of reasons. Firstly, it incorporates an inductive approach in which the focus of the social scientist is the process by which the social world is constructed, as opposed to the natural scientist's approach of studying "preconstituted phenomena"

(Bryman 2001, p. 18). This inductive approach also makes constructivism one of the key paradigms for theory development research (Creswell 2014). Secondly, social constructivism can be an iterative approach, allowing the researcher to undertake research, then select or develop a model, but then return to the research to investigate concepts further (Bryman 2001). This iterative nature also makes allowances for a changing landscape in terms of information technology that the literature review has already alluded to, and which the disaster information seeking model will need to accommodate. Thirdly, researchers using the social constructivist paradigm see culture as an emergent reality that changes and develops constantly, instead of seeing culture as an unchanging external reality that acts on and constrains people (Bryman 2001). In this way, knowledge is the product of social interaction, interpretation and understanding, and this interaction causes changes in both the subject and the environment (Adams 2006; Talja, Tuominen & Savolainen 2005). Fourthly, social constructivism is an approach used by researchers in both communication scholarship (Keaton & Bodie 2011) and in the information science field (Talja, Tuominen & Savolainen 2005), and was the tradition used in the development of Savolainen's information seeking model, which has provided the basis for this thesis.

The ontology of social constructivism is subjective. Reality is a product of a changing social process, where construction of knowledge is the product of social interaction, interpretation and understanding (Adams 2006). Recognition and understanding of truth occurs when the social group agrees on a common construction of reality, and it is possible for different social groups to develop different versions of the truth based on different constructions of reality (Adams 2006).

### *3.1.3. Social constructivist epistemology*

Social constructivists use an interpretivist epistemology, and often use grounded theory to develop a theory to explain the phenomenon under study (Charmaz & Liska Belgrave 2012; Petty, Thomson & Stew 2012). This thesis will use the social constructivist inductive and iterative approach, but it will not be situated in grounded theory because of its starting point with the disaster information seeking model developed from the literature. Grounded theory guides research methods from a starting point of no theoretical framework (Charmaz & Liska Belgrave 2012).

## 3.2. Research methods and analysis

The research methods and analysis will be defended as the makings of a social constructivist doctorate. The inductive approach of social constructivists was explained earlier, and while it is generally associated with qualitative research methods (Bryman 2001; Tashakkori & Teddlie 2003), it also lends itself to use of a blend of qualitative and quantitative methods of research (Greene, Benjamin & Goodyear 2001; Johnson & Onwuegbuzie 2004; Waszak & Sines 2003). A sequential mixed methods approach will be used in this thesis for a number of reasons. It provides us with a better understanding of the problem than if just one dataset was used (Creswell & Plano Clark 2007). The strengths of a method can offset weaknesses in another method, countering weaknesses (Creswell & Plano Clark 2007). It can answer questions that individual methodologies cannot, it provides stronger inferences, and provides opportunity for a presenting a greater diversity of divergent views (Tashakkori & Teddlie 2003). It is also 'practical' in that it allows a researcher to access whatever methods are necessary to answer a question (Creswell & Plano Clark 2007).

The methods used in this study were:

1. Semi-structured interviews;
2. An exploratory survey; and
3. A validation focus group.

The semi-structured interview is just one qualitative methods that could be used in this research. Alternatives are the focus group, observational studies, special data sources such as panels (Cavana, Delahaye & Sekaran 2000), and experiments (Sproull 1995). However, successful focus groups depend very much on group dynamics, which to some extent can be mitigated by grouping people of the same age, ethnicity, education levels and other demographic features . Failing to account for power imbalances can affect the input of some members of the group (Mansell et al. 2004), contaminating the outcome when stronger members contribute more than more introverted members (Cavana, Delahaye & Sekaran 2000). In this study, respondents for qualitative data collection were not able to be vetted for age, positions within their community and where they belonged in the power structure. In addition, focus groups require the availability of between six and ten respondents at one time, which can be difficult to achieve. Focus groups also shift the focus of the interaction from the person being interviewed in a one to one interview, to the interviewer in a focus group, who must guide

the discussion and in some cases elicit more information, which can inadvertently disrupt the interaction and create an agenda that may not have emerged in an interview (Morgan 1996). Sussman et al also discovered a polarization effect in focus groups that did not seem to occur in interviews (1991). Focus groups are useful in exploring concept and ideas, but not as good when it comes to sharing detailed experiences of an event (Lindlof 1995).

Observation is another research methods that can reveal behaviour in specific circumstances and can either be completed in person or by filming the subject (Sproull 1995). It is effective in disaster recovery research However, observation relies on the prior knowledge of the researcher that the activity he wants to observe will occur at a certain time in a certain place – a difficult requirement to fulfill in disaster research that investigates warning and response phases of disaster in situations. In addition, subjects can change their behaviour because they know they are being watched and the sessions can be time consuming compared with other methods (Sproull 1995).

Panels are another form of research in which individuals, pre-selected from the community, are contacted at different stages of a project to meet as a group to give their ideas and opinions on certain topics over a number of meetings (Cavana, Delahaye & Sekaran 2000). Because the data sought related to a specific time period that would not need multiple sittings to elicit, panels were not regarded as a possibility for this project.

Another method was experiments, where participants are presented with information or a situation and their reactions observed and recorded, or self reported in a later interview (Liu, Jin & Austin 2013). Because an opportunity presented itself to measure reactions to a real disaster, experiments were not considered in this instance.

Semi-structured interviews have become the "pre-eminent method in communication and other social sciences" for conducting research (Lindlof 1995, pp. 163-4) and is widely used in disaster research (Phillips 2002). They are useful for exploring unknown situations and uncovering issues that might have been missed in a survey (Cavana, Delahaye & Sekaran 2000), the interviewer has the scope to explore topics raised by the participant in more depth, read body language, and verify data received from other sources (Lindlof 1995). In the case

of this study, semi-structured interviews were selected because of the discovery process of the research, given that only bushfire information seeking had been explored in any depth in Australia; arranging the individual interviews rather than a panel or focus group was much easier for the researcher in each community than other methods; the potential depth and richness of the stories of each participant deserved one-to-one attention compared with the shared time of a panel or focus group; and it was not possible for the researcher to set up observation of multiple people in the process of information seeking as a disaster approached their community.

After the interviews, an online and mailed questionnaire surveys were used to collect quantitative data. Alternative quantitative social science data collection methods were face to face questionnaires and Delphi surveys. Delphi surveys feature a panel of respondents who complete a series of surveys over time, with the questions for each survey arising from the analysis of the previous survey. Panel members are usually a groups of people with certain expertise (Hsu & Sandford 2007), are generally used to achieve consensus on a topic, and give respondents the opportunity to modify their responses based on feedback from the previous survey (Thangaratinam & Redman 2005). Face to face surveys are time consuming and are also restricted to certain geographic areas (Bourque, Shoaf & Nguyen 2002). Delphi questionnaires are useful for situations that are changing and participant responses are required to help with planning or product development (Thangaratinam & Redman 2005). The online and mail questionnaires were chosen because they could be implemented in a convenient location and were not researcher dependent. In addition, the mail questionnaire could be aimed at a specific population demographic that could be missed in the online survey data collection.

More detail will be provided on each research method, its design, strengths and weaknesses, implementation and analysis in following sections. Figure 3.3 is a graphic representation of the methods and how they fit together.

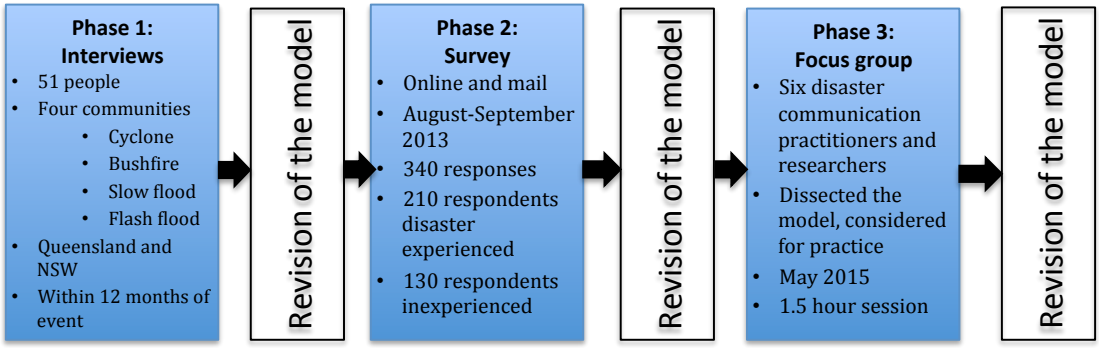



**Figure 3.3 The research process undertaken for this thesis**

This diagram shows the step-by-step nature of the research conducted for this thesis, and the way each step was intended to further build the model that was developed in Chapter 2. It is a sequential mixed methods project in which each research method informs the subsequent analysis, allowing findings from each stage to be interpreted iteratively (Onwuegbuzie et al. 2007). The diagram clearly shows the iterative and inductive process that underpins this project. The project is a true mixed methods project according to Onwuegbuzie, Slate, Leech and Collins' Mixed Methods Analysis Matrix (2007, p. 8), which classifies true mixed methods as using both data types and analysing using both analysis types, termed 'multi-type mixed analysis'. This is shown in Table 3.2.

**Table 3.2 Research methods and research analysis**

| Type | Analysis method |
|---|---|
| *Interviews* | |
| **Qualitative** | - Qualitative<br>- Quantitative |
| *Survey* | |
| **Quantitative** | - Qualitative |
| *Focus group* | |
| **Qualitative** | - Qualitative |

Each of these methods will be explained from the next section forward. However, all of the stages of data collection and analysis will be subject to the following steps (Onwuegbuzie et al. 2007, p. 12):

1. Data reduction – reducing the dimensionality of the data (for instance, undertaking descriptive analysis or thematic analysis);
2. Data display – presenting the data in, for example, tables, graphs or charts;
3. Data transformation – quantitised or qualitised analysis of the data; and
4. Data integration – the final stage in which findings are integrated into a coherent whole (in this case, the final model).

The next three sections will explain the design and implementation of the three research methods used in this study – semi structured interviews, online and mailed survey, and a validation focus group.

### *3.2.1. Phase one: semi-structured interviews*

Wimmer and Dominick (2000, p. 112) maintained that the best way to record and examine human behaviour was via observation, particularly overt observation, as it tended to eliminate the problems of recollection and enhancement of events that could occur when researchers asked people to recount their behaviour after the behaviour occurred. This presented problems in disaster research, as the context of this field makes it unique (Stallings 2002). Usually the location of the research can not be predicted in advance and therefore field observations can not be arranged during an event. Once a disaster occurs, the researcher has a small window of opportunity before accurate recollection by disaster survivors fades (Killian 2002), a factor that lends itself to interviews, surveys or focus groups.

#### 3.2.1.1. Rationale for interviews

In investigating information seeking, where each situation could produce new or previously unrecognised sources and pathways, interviews have been standard for testing ELIS models (Kari & Savolainen 2007), and particularly Savolainen's "mastery of life" concept of the model (2008a, 2010). Savolainen's own finding (2008b), in which 132 unique source preferences were identified, showed that exploratory research using interviews or some other qualitative technique was necessary for this project before an attempt was made to secure information via a more closed instrument such as a survey.

Reflecting Savolainen's (2008a) approach, this disaster information seeking study employed semi-structured interviews as a necessary first step to ensure that a foundation set of information source preferences, pathways and behaviours, which were theoretically presented in the model, were identified. This process was identified as useful for "…discovery of unanticipated, but potentially beneficial information… " by Austin and Pinkleton (2006, p. 141). Because the review of the disaster literature revealed few articles that presented a comprehensive set of information sources or steps in information seeking behaviour, it was necessary to first "determine the data to be sought" (Case 2008, p. 178) and to review information seeking behaviour in the context of the disaster information seeking model. Face-to-face interviews were conducted to do this. Information secured during the interview study then guided development of the later survey instrument (described later in this chapter, with results reported in Chapter 5).

In disaster research, interviews were a staple of early investigations and used mainly because of the requirement for a careful approach to eliciting information from people who had experienced a disaster (Killian 2002). The disaster research community has long recognised that different methods are appropriate for different types of disasters, even though interviews were the predominant method used in the early days of research. In the 1950s, Killian wrote that the more sensitive in-depth interview was more successful in securing information from respondents who experienced a more violent and high impact disaster, and the more impersonal survey proving successful for respondents who experienced a less violent and lower impact disaster (Killian 2002, p. 74).

In-depth interviews, a survey and a focus group were the three methods used in this study. This chapter will detail the design and implementation of each, and results will be reported in Chapters 4-6. Each of the results chapters will contribute to further development of the disaster information seeking model that was first articulated in Chapter 2. The aim of the three studies was to consider all natural disasters, but working within the Australian disaster context restricted the breadth of disaster types available for this consideration. This resulted in the interviews reviewing only four of the main disaster types experienced in Australia – bushfire, cyclone, slow flood and flash flood – because other disaster

types had not been experienced in Australia or communities affected by these disaster types not easy to access for the researcher.

#### 3.2.1.2. Interview aims

The interviews aimed to do three things:

1. To discover information seeking behaviour patterns for comparison with the model developed in Chapter 2;
2. To determine whether the disaster information seeking model presents a reasonable framework for research in this field; and
3. To use the outcomes of the interviews to develop a survey instrument for future review of the model.

#### 3.2.1.3. Interview respondents

Four Australian communities were selected for this stage of the research based on the type of disaster they recently experienced and the ability of the researcher to travel to the communities to conduct the interviews. The communities selected for this research were:

- Toowoomba in Queensland, flash flood;
- St George in Queensland, slow flood;
- Airlie Beach in Queensland, cyclone; and
- Gerogery in New South Wales, bushfire.

These communities (shown in Figure 3.4) were selected because the disasters that affected them caused three of the impacts referred to in Porfiriev's (1998) definition of a disaster. The first impact was disruption of social and physical connections and communications (including deaths). Three of the communities lost power and telephone services; evacuations were undertaken at St George and Gerogery; two people died in Toowoomba and access to the city was cut for a number of days. The second impact was partial or total destruction or demolition. Gerogery lost five homes, seven outbuildings and a large number of livestock; at Airlie Beach, homes were unroofed, boats washed ashore and power infrastructure damaged; in St George, at least 40 people were evacuated and 25 homes were inundated. In Toowoomba, infrastructure, buildings and businesses were destroyed. The third impact was the necessity for extraordinary or emergency counter-measures to re-establish stability. At Toowoomba, St George and Airlie Beach, the local disaster management groups were activated, and at

Gerogery, the local emergency management committee was activated. In all cases, an emergency was declared, enabling residents to gain access to disaster relief funding.

The use of Porfiriev's (1998) disaster classification was necessary to ensure the research measured reactions to what was accepted to be a disaster, as opposed to reactions to a minor crisis, or a natural occurrence that was not really out of the ordinary for the communities to be studied. Quarantelli (1998) complained that lack of a definition of a disaster resulted in any type of individual or group stress situation being studied and the results presented as disaster research. He presented research on the effects of disaster on mental health in the 1980s and 1990s as a case in point, where disputes arising from the results of the research could have been solved by better defining disaster. The map in Figure 3.4 below shows the interview communities.


**Figure 3.4 The locations of interview communities**

Sampling for the research was reviewed against the demographic profile of each community and it was the intention to use purposive sampling where possible.

Snowball and convenience sampling were the predominant techniques used. Snowball sampling is a purposive sampling technique in which the researcher makes contact with a small group of potential respondents and then uses this contact to establish contact with others who might be relevant to the research (Bryman 2001). It is generally used when the researcher is seeking respondents with specific characteristics or knowledge and these are difficult to find (Cavana, Delahaye & Sekaran 2000). It is unlikely that this method of sampling can produce a sample that is representative of the population, although researchers can select individuals in an attempt to make the sample representative (Bryman 2001). Another drawback of this method is that bias can potentially occur, as the primary respondents may recommend people who hold similar views to themselves (Cavana, Delahaye & Sekaran 2000; Lindlof 1995). Press attempted to counter this by using "several snowballs to start off each group" (1991, p. 179). Snowball sampling as a technique that takes advantage of circumstances and events as they arise and is useful for identifying respondents who can make a strong contribution to the study (Kemper, Stringfield & Teddlie 2003). Snowball sampling for this study provided the advantages of securing respondents who had experienced the disaster that affected their community and who were also available to speak with the researcher during the study period. Potential bias was limited by using a number of sources in each community to recommend potential participants. Snowball sampling was used for the interviews in all four locations. In St George, three initial sources were used, creating three snowball samples; in Gerogery, one contact was used to generate the sample; in Toowoomba one contact was used to generate one sub-sample, and in Airlie Beach, four contacts were used to create four snowball samples. All were selected for their representativeness of their local community.

Convenience sampling is also a purposive method that involves sampling an easily accessible or volunteer population (Kemper, Stringfield & Teddlie 2003) and like snowball sampling, attempts can be made by the researcher to select respondents that are representative of the population. The findings of studies that use convenience sampling cannot be generalized (Bryman 2001; Kemper, Stringfield & Teddlie 2003). It is most often used in the first stages of a study when issues need to be explored (Cavana, Delahaye & Sekaran 2000) and researchers recommend that discrimination of participants be shown during the recruitment stage of this method (Lindlof 1995). Of the Toowoomba sample, 12 of the 14 participants were created by convenience sampling and selected for how they fit the profile of the Toowoomba community.

In St George and Airlie Beach, local councils were contacted and were able to provide several local contacts who were then able to put the researcher in touch with others who consented to be interviewed. These participants were asked for the names of people they thought might be willing to be interviewed. Two friends of the researcher who were from the St George district were able to provide a number of contacts who consented to be interviewed, and respondents in Gerogery were also recruited via a friend of the researcher. In Toowoomba, two interviewees were recruited via a request through the work network of the researcher, and the rest of the interviewees were work colleagues and friends of the researcher.

#### 3.2.1.4. Interview schedule

The interview questions were developed from the literature review and attempted to explore each section of the disaster information seeking model developed in Chapter 2. The interview protocol incorporated questions about information sources and how people looked for information once they knew about the disaster (information pathways). Respondent interviews, a technique that elicits open-ended answers to a series of directive questions (Lindlof 1995), were used (see Appendix 1).

The interviews were structured into five sections. The structure of the interviews was developed from Cavana's pattern of an interview (2000, pp. 138-41) and included suggestions from Lindlof (1995). Stage 1 included "entrance time investment" – the initial greeting, talk about the weather or other general topics, and an explanation of the project and the interview process. Stage 2 was Cavana's "activity no. 2", where the interviewee entered a rapport zone and the interview proper could start. In this case, the questions asked in this stage related to day-to-day media and information consumption and allowed the interviewer to 'tune in' to the style of each participant. Stage 3, the "intimacy" stage, was not required on this topic, as Stage 3 of Cavana's pattern referred to the point at which emotions were explored. In this case, the interview was a recount of behaviour rather than an exploration of emotion. The first four sections of the interview questions occurred within Cavana's stages 2 and 3. Stage 4, the "exit time investment" stage allowed the interviewer to ensure the interviewee had a chance to revisit an area that he or she wanted to talk more about or that he or she thought the interviewer had not asked about. This stage was characterised by

comments such as, "Well, that's all I have to ask, is there anything you'd like to talk more about?" and marked the finalisation of the interview with goodbye and thankyou.

After the warm-up of Stage 1, the first part of stage 2 contained one question, easing respondents into the task by asking them about how they got information from day to day. This is what Lindlof (1995) called a 'grand tour' question, designed to place the respondent as the expert and to build rapport between the interviewer and respondent. A side effect of this question was that the interviewer was able to tune into the speech and thought patterns of each respondent before getting onto the more critical part of the interview. The second section of interview questions, also occurring in stage 2, contained 17 questions relating specifically to the topic of how people received and sought information in the impact phase of a disaster – a second 'grand tour', but closely aligned to the disaster information seeking model. It incorporated questions that closely reflected the disaster information seeking model proposed in Chapter 2 about:

- how the respondents first heard about the disaster;
- where they then went for more information;
- what their information seeking process was after that confirmatory point;
- which information source they used the most;
- how much time they spent looking for information each day;
- what they were looking for; and
- whether they received information that conflicted with other information that they had received.

A set of 17 questions was designed to elicit all the possible responses that might then be used in the later survey in an effort to fulfill the third aim of the interviews. These are presented in Appendix 1.

The third section of the interview asked people to represent graphically the importance of information sources, thereby plotting their information sources into 'source horizons' that were used by Savolainen (2008a) to represent source preference. This spatial/visual analogue helped the participant provide their account (Lindlof 1995), and in some cases during the interviews, prompted the respondents to remember an information source that they had not previously

spoken of. In addition, the diagram clearly demonstrated the respondents' source preferences as explained by Savolainen and gave some context to information seeking a situation with more urgency than every day problems.

The fourth section contained two questions asking people to think about obstacles that occurred during the information search. These were included because difficulties getting information had arisen in a number of research articles during the literature review, whether the hindrance was lack of electricity (Fu et al. 2010; Goudie & King 1997), too busy dealing with the hazard (Erikson 1976; National Weather Service Central Region 2011) or geographic isolation (Erikson 1976). The fifth section was one question that probed the effect of experience on future information seeking in a disaster, following on from confirmed relationships between experience and behaviour in the disaster literature (Ripley 2009; Sattler, Kaiser & Hittner 2000). The last question, occurring in Cavana's Stage 4, was the 'loose-ended question' that returned the agenda to the respondent in a way recommended by Lindlof (1995) and gave each person an opportunity to raise something they had not had a chance to mention or to expand on any part of their response.

In addition to the interview questions, respondents were asked to fill in a basic profile questionnaire (see Appendix 2) that asked for demographic and situational information. The demographic information was necessary to allow the researcher to determine how much the respondent samples diverged from the population they were drawn from. The situational questions were necessary to ensure the respondent was part of the community during the disaster and to gauge their level of knowledge about the disaster. The questions asking about respondents' contacts within emergency services was in response to findings by Cohen, Hughes and White (2007) that people in a rural area of Victoria tapped into emergency service communication networks for information during a bushfire. This question was also useful to determine if the respondent's normal information seeking pattern may have been influenced by disaster management knowledge. It was not the intention, in collecting this data, to use it for analysis of the influence of receiver characteristics on their information seeking activity.

The interview questions were restricted to what people did and how they did it in terms of information seeking. This study is not intending to explore why people do what they do, which will be material for future research once

knowledge of information seeking patterns in a disaster are established. The literature review showed no previous exploration of how Australians seek and receive information in a disaster, so it was considered that this thesis should study just this base activity in order to keep the project to a manageable size. For this reason, this project will not explore effects of Savolainen's source preference criteria to any depth, aiming to keep the focus on what research subjects did, rather than why they did it.

#### 3.2.1.5. Data collection

The researcher undertook interviews during the following periods:

- 12-31 August 2011 in Toowoomba;
- 10-13 October 2010 in St George;
- 9-13 December 2010 in Gerogery; and
- 26-29 October 2010 in Airlie Beach.

Respondents were interviewed mainly in their homes, but some were interviewed at the hotel where the researcher was staying or in a local coffee shop. Five people in Airlie Beach, one in Toowoomba and two in St George were interviewed at their workplace. All the respondents signed consent forms (see example in Appendix 3) and agreed to be recorded. In one interview at Airlie Beach and one at Toowoomba the digital recording device failed but detailed notes were taken and used in place of a transcript.

In all, 51 interviews were undertaken between October 2010 and July 2011. In Toowoomba, 14 people were interviewed, 13 in St George, 11 in Airlie Beach and 13 from the Gerogery area. Respondents were interviewed either by themselves or with their partner. Interview lengths ranged from 12 to 72 minutes, and respondents were asked around 17 open ended questions (see Appendix 1), with some additional questions asked by the interviewer if a response needed further exploration. In addition, each respondent was asked to plot their information sources in terms of importance, onto a source horizons diagram (see Appendix 4) similar to the one used by Savolainen (1995, p. 89). The recordings were then transcribed into Microsoft Word documents for each participant.

### 3.2.1.6. Interview reliability and validity

Reliability was ensured by consistent note taking and recording each interview(Fisher et al. 2007, p. 8); using additional methods, that is, using the information source maps drawn by participants to support and illustrate interview data; comparing emerging themes with similar studies; using just one coder to attempt consistency; and analysis of data for incidents of observer effect (Fisher et al. 2007, p. 8).

Four different types of validity identified by Tashakkori and Teddlie (2003) were addressed in four ways. The first was by ensuring face validity, where the questions were informed by close study of the literature on disaster information seeking and a model of disaster information seeking. The second was internal validity, on which all interviews were recorded digitally and by note taking, more than two methods were used and these were further enhanced by the use of a later field survey. Thirdly, external validity was ensured by describing the methodology in detail to allow replication and/or comparison with other studies. Fourthly, construct validity was secured by tying the interview questions to the disaster information seeking model developed from Savolainen's model of problem-specific information seeking. It used his constructs of information sources to determine information horizons and information pathways

### 3.2.1.7. Interview analysis

Three steps were undertaken to analyse the results. Firstly, measurable data, such as the number of times a particular source was identified as the alert source, was entered into the quantitative software package SPSS to provide easier reading of this data. Secondly, the disaster information seeking model developed in Chapter 2 was used as the basis for manual thematic analysis. Thirdly, the interview transcripts were entered into the qualitative software package Leximancer to check the manual thematic analysis and to identify further networks within the data.

The interview data was not analysed for effects (for instance the effects of age, gender, location, experience), mainly because the purpose of interview stage of the study was to explore the possibilities in terms of information seeking patterns and outcomes. Sample size of the interviews also prevented such analysis from being undertaken. At each site, between 11 and 14 interviews were undertaken,

which represented response rates ranging from 0.036 and 0.00009%. In addition, in some aspects (especially age, where under 25s were barely represented), the interviewees did not represent the wider population. The interviews were purely an exploration phase that provided a solid foundation for development of the survey instrument.

**Treatment of numeric data**

Measurable data from the interviews was entered into the data analysis software SPSS, although the data was not attached to personal information of specific contributors: items such as the first alert, where the respondent turned for more information, the respondent's main source of information, what they were looking for and their social interaction were used. While this is generally the convention in terms of quantifying the characteristics of focus group or survey respondents, it is also what Tashakkori and Teddlie (2003) called quantitising of qualitative data and was necessary to establish the possibility of relationships that could be further explored in the later survey. Quantitising qualitative data refers to "the numerical translation, transformation or conversion of qualitative data" (Sandelowski, Voils & Knafl 2009) and can be undertaken by converting interview data into scales (Miles, Huberman & Saldaña 2013), which was particularly useful in plotting the pathway of information behaviour in each community in this present study. The identification of information behaviour is the central aim of this study. Quantitising qualitative data is much more than profiling the participants and their characteristics (Tashakkori & Teddlie 2003), and in this case, the SPSS custom tables will be used clearly present the factors that were identified in the disaster information seeking model, rather than to undertake any statistical analysis. This quantitative data supplements the narrative provided in Chapter 4, and informs further development of the disaster information seeking model.

**Manual thematic analysis**

Thematic analysis is a method for identifying, analysing and reporting patterns within data (Braun & Clarke 2006). It is systematic, objective and quantitative (Wimmer & Dominick 2000) and involves six phases (Braun & Clarke 2006). Firstly, the researcher becomes familiar with the data, which can be undertaken at the interview stage and also during the interview transcription process, but always involves repeated reading of the transcripts. Secondly, initial codes, or the

most basic segment of the raw data, are generated (Braun & Clarke 2006), often against a model and/or literature from the field (Fereday & Muir-Cochrane 2008). Thirdly, themes are sought from the transcripts, where by the information that is coded is sorted into the themes that emerge from them (Braun & Clarke 2006). Fourthly, the themes are reviewed; the fifth step is defining and naming the themes, and the sixth step is to write the report of the analysis (Braun & Clarke 2006).

This study will undertake each of these steps and this section is concerned with Braun et al.'s steps 2 to 5. However, the order will be somewhat changed, because the themes, which generally emerge from the interviews following the coding, were already determined by the disaster information seeking model. Each component of the model represents a theme. So firstly, the transcripts were compared against the disaster information seeking model and the themes represented by each model component were drawn out and concepts within the themes coded by the researcher. The first coding schema was closely reflected the literature that informed the disaster information seeking model and the model itself. Each concept was identified with a colour and a letter/number combination. For example, where a respondent identified a first alert source, the phrase he or she used was marked with pink pen, and then identified by its number in the right hand margin. The letter denoted the component of the model – Alert = A and so on. Each alert source was then given a number – so the identification code for 'other people by phone' was A1, 'other people face-to-face' was A2 and so on. The colour highlighting helped identify the specific phrase to which the specific coding schema applied. The concepts in the pre-analysis list were: the first alert (pink, Ax), source preference criteria (factors influencing selection of sources and presented in list form in Chapter 2) (purple, Sx), confirmation sources (black, Cx), main sources (green, Mx), source sequences (yellow, SSx), sensemaking (aqua, SMx) and what people were looking for (orange, Wx). Each disaster type was analysed and reported separately.

Once the first coding schema was established, it was tested on the bushfire interviews to ensure that all concepts had been accounted for within the schema. This testing of the coding schema showed that a number of concepts were not covered by the schema: triggers for activity or further information seeking became evident and were included (identified as Triggers, blue, Tx) and sources that were mentioned, but were not important also needed to be accounted for (identified as Other useful sources, red, Ox). The completed coding schema is

included in Appendix 5, and was then used on new copies of the bushfire transcripts, as well as the transcripts from the interviews from the three remaining disasters.

Each transcript was analysed, phrases that identified concepts were underlined, and the phrases marked in the right margin with its identifying code. All of the interviews were coded this way, and then the coding process was repeated after a period of two months to ensure all of the concepts had been marked and identified.

Figure 3.5 provides an example of what a coded transcript looked like once it had been analysed twice. All 51 interviews were analysed this way.

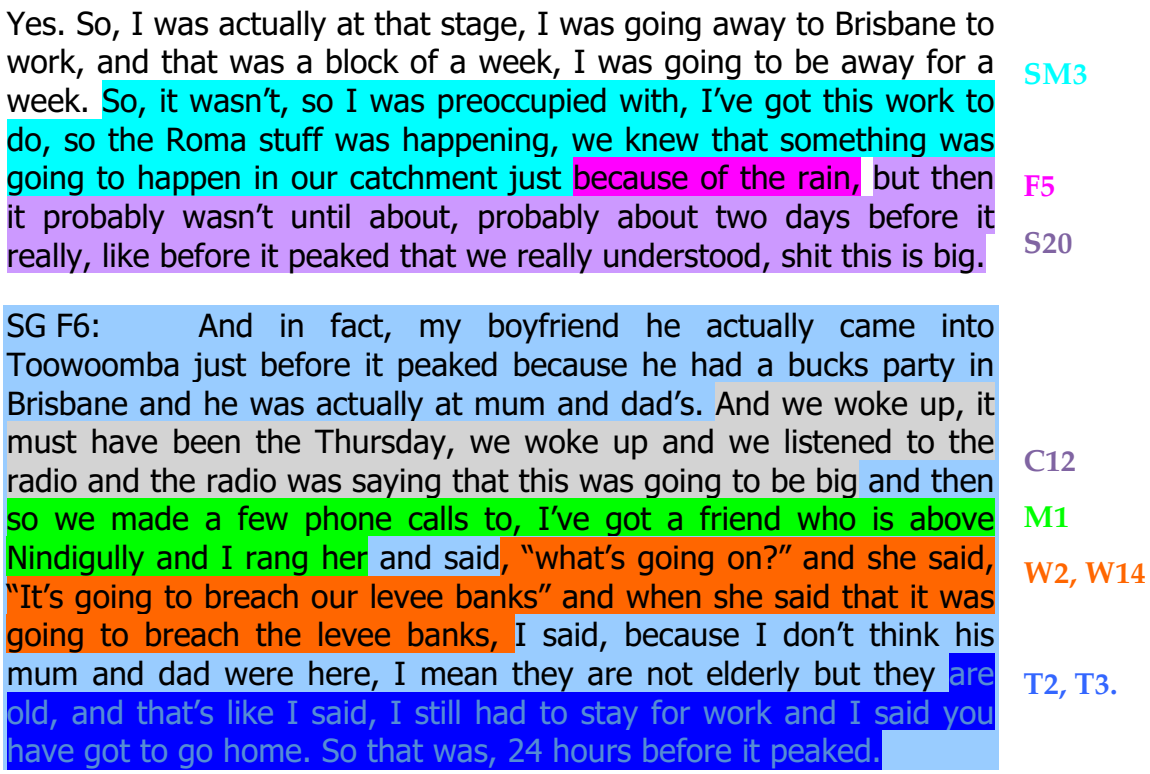



**Figure 3.5 An illustration of the coding method used to analyse the interviews**

**Automated thematic analysis – checking for gaps in the analysis.**

For this third stage of analysis, the transcripts were entered into the qualitative software Leximancer and the emergent themes were compared with those themes that emerged from the researcher's comparisons with the model. Themes that had not seemed significant in the first stage of the analysis, but emerged as

significant in the Leximancer analysis, were examined. This was an important step in the analysis of the interviews in order to uncover concepts, pathways and networks that may not have been obvious using the initial manual data analyses. Leximancer, which employed semantic extraction followed by relational extraction (Smith & Humphreys 2006), was also an important choice for this process. This was because it "can automatically extract its own dictionary" (Leximancer 2010), thereby eliminating shortcomings in human coding processes and consistency (Scott & Smith 2005). Such shortcomings may have been present in the first stage of the analysis where the model's concepts were used to draw out themes manually. Because relationships were also important in this stage of the analysis, Leximancer provided a view of how concepts were related to others in a multi-dimensional way (Leximancer 2010), building on the linear view that emerged from the first stage of the interviews analysis. A second advantage of using Leximancer was that it helped to avoid un-necessary focus by the researcher on particular anecdotes told by respondents that might obscure other concepts (Smith & Humphreys 2006).

Leximancer qualitative analysis software undertakes unsupervised semantic mapping of natural language that uses algorithms for two stages of analysis: semantic and relational (Smith & Humphreys 2006). Word clusters are formatted into 'concepts' and the text then classified into these concepts. A number of other processes are used to ensure the concepts are valid, and to generate a third dimension to the analysis with more general parent concepts applied to the data (Smith & Humphreys 2006). Emerging concept groups are identified as 'themes', and identification of these is improved by employing a sound hierarchy of concept connectedness, which introduces the relational aspect of the software (Smith & Humphreys 2006). The result is a graphic representation of the concepts and themes, with the largest group of connections represented by red, and themes colour coded through orange, yellow, green and blue to the smallest number of connections represented by purple. This concept map is then used to investigate emergent themes and connections.

Before loading the transcripts into the software, the transcripts were cleaned of typographical and spelling errors, and also segments of conversation that were not relevant to the interview, such as the respondent offering the interviewer a cup of tea. Styles, for example the mention of times and the spelling of names for different media outlets, were standardised in order for the software to develop

themes from every mention of a concept. For instance, 3 o'clock was changed to 'three o'clock', and channel 10 to Channel 10 across all the transcripts. The numeral 10, when used in reference to a television station by itself, was changed to Ten. This will be explained in more depth later in this section.

The transcripts were then loaded and a concept map immediately developed for each location and disaster type to identify problems. One of those problems was the identification by the software of 'interviewer' and some of the various respondents as concepts, and this was corrected by ensuring that 'dialog tags' were applied in the process to prevent this from recurring. An example of the initial concept map, this one run for the Airlie Beach cyclone interviews, is included below. In this diagram, half of the themes, identified by the coloured circles and the matching coloured label, were related to the interviewer and individuals who were interviewed (for example, Abm2, Abf3). A sample concept map is shown in Figure 3.6.

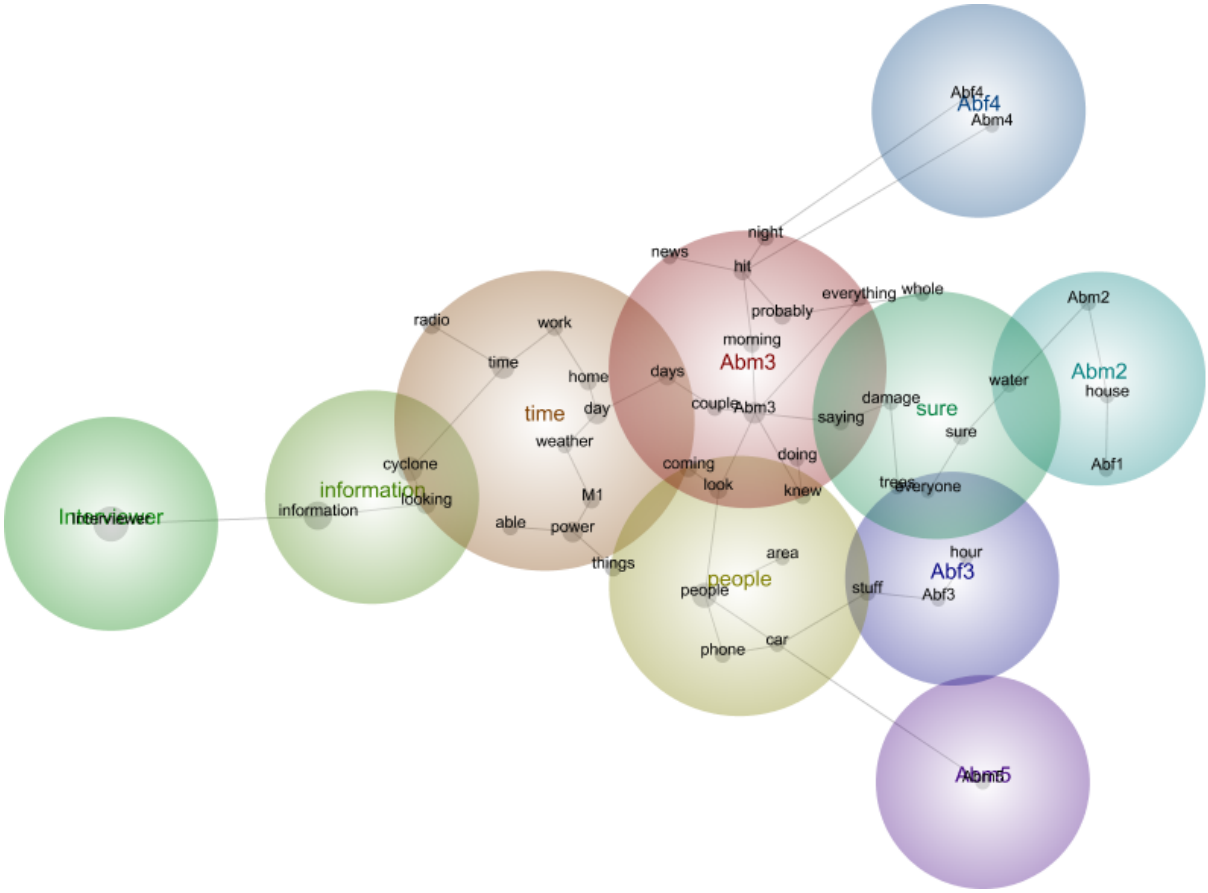



**Figure 3.6 Sample concept map generated by Leximancer**

The colour coding was further explained by the legend drawn from the Airlie Beach concept map. The colour of the circles relates to the hierarchy below, and the 'hotter' the colour, the more connected the theme throughout the batch of transcripts. The legend for the concept map looks like the chart presented in Figure 3.7.

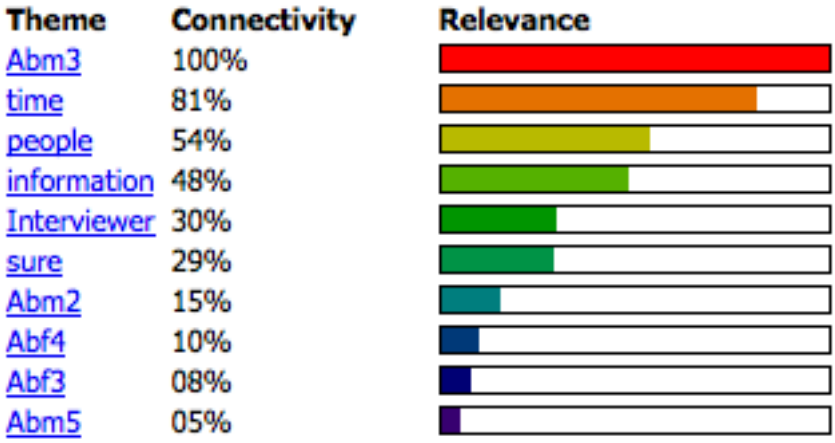



**Figure 3.7 Sample legend for the concept map in Figure 3.6**

Once these identifiers were cleaned from the data, additional manual manipulation of each concept and their thesaurus was undertaken. The transcripts had been carefully read and a thesaurus of words developed for refinement of the analysis. This was necessary, because of the different terms individuals used to describe a common item – for example, ABC radio in Queensland was also described by interviewees as "David Iliffe's program", "612" or "747". All of the terms used to identify ABC radio were collected. The following Table 3.3 provides a list of the words that were identified as a simile for a particular concept and these similes were then added to the thesaurus and merged with the main concept:

**Table 3.3 List of standardised terms across interviews**

| Concept | Similes |
|---|---|
| **ABC radio** | David Iliffe, Steve Austin, Classic FM, Triple J, 711, ABC Rural, Marley Davis, 747, 612, Radio National, Gaye Patterson, wireless |
| **ABC television** | 7.30 Report, Landline, News 24, Press Club, Midday News, evening news |
| **BOM** | Bureau of Meteorology, BOM, the Bureau, Bureau of Weather, gauges, flood height bulletins |
| **Commercial radio** | Zinc FM, ZincFM, 4ZR, 102.9, 2AY, 4GR, 4MK, CFM, SeaFM, Sea FM, Hot FM, HotFM |
| **Commercial television** | Channel 10, Ten, Channel 7, Seven, Channel 9, Nine, SBS, Today Show, Sunrise, Kochie, Imparja, WIN, Austar, Prime, Southern Cross |
| **Cyclone** | Track, strength, Ului, eye, hit |
| **Disbelief** | On drugs, shocked, couldn't believe, extreme, enormity, can you believe this |
| **Electricity** | Power, electricity, Ergon, Energex |
| **Emergency agencies** | Police, Fire, RFS, QFRS, ambulance, copper, QPS |
| **Experience** | Justin, Celeste, history, fishermen, 70s, 80s, 90s, 1990, 1956 |
| **Family** | Son, daughter, aunt, aunty, mother, mum, uncle, dad, father, grandmother, grandfather, cousin, brother, sister, relatives, mother-in-law, hubby, husband |
| **Local council** | Balonne Shire, local government, LDMG, TRC, Toowoomba Regional Council, the council |
| **Mayor** | Mayor, mayors, Donna Stewart, Donna, Michael Brunker, Mike Brunker |
| **News websites** | Ninemsn, news.com, Bigpond |
| **Newspapers** | Balonne Beacon, Country Life, Courier Mail, Courier-Mail, Daily Mercury, Townsville Bulletin, Proserpine Guardian, Border Mail, The Age, The Chronicle, Chronicle, Weekend Australian, The Australian, Financial Review, The Mail |
| **Other weather sites** | Elders, Weatherzone, NASA, Seabreeze, buoy.com, weather.com, Oz Forecast |
| **Others** | Girls, neighbor, family, friend |

| Concept | Similes |
|---|---|
| **River** | Balonne, Maranoa, Moonie, Mt Driven, Chelmer, Flinton, Tilba |
| **Social media** | Social media, Facebook, Twitter, Toowoomba Flood (this was a Facebook page that respondents referred to) |
| **Telephone** | Phone, landline, mobile, rang, ring, telephone |
| **Time** | O'clock, midnight, in the morning, AM, PM |
| **Visuals** | Smoke, fire, flames, water, rain, photos, flood maps, roaring water, drive, reconnaissance, have a look |
| **Water agency** | Water Resources, Sunwater, SunWater |
| **Web** | Internet, the web, Googled, Google, Yahoo, the computer |

This list was then applied to all four analysis folders – Toowoomba flood, St George flood, Airlie Beach cyclone and Gerogery bushfire - within this Leximancer project.

Once the data was processed, the results for each disaster type, which were represented by a connectivity table and a diagram showing the importance of themes and their connections, were compared with the results from the first and second stages of the analysis and the resulting model. Each of the most connected themes was investigated against the first stages of analysis to ensure they had been accounted for in these stages. In some cases, themes emerged from the Leximancer analysis that had not been noted in sufficient depth in the first and second stages of the interview analysis. These overlooked themes and their networks were then explored and discussed, and if necessary, further adjustments made to the model.

**Interview analysis conclusion**

Profiles of respondents and the data collected from them will be reported in the next chapter, Chapter 4 Phase One: Interviews analysis. The analysis reported in Chapter 4 will also be used to adapt the disaster information seeking model to emerge with a version of the model that can be investigated by the survey. The survey design will now be explained.

### *3.2.2. Phase Two: Survey design, implementation and analysis*

The interview study that was explained in the previous chapter was conducted using one-to-one interviews, a technique recognised to produce rich data, but not data that could be generalised across a population (Case 2008; Kindra et al. 1993; Wimmer & Dominick 2000). Surveys, however, enable researchers to generalise across a population providing the sampling methods provides external validity to the data (Bechhofer & Paterson 2000) and have also been an accepted method for hypothesis testing (Cavana, Delahaye & Sekaran 2000). In addition, surveys can attempt to analyse problems in real-life situations (Wimmer & Dominick 2000), an advantage in disaster research where replication of a disaster setting is difficult for experimental research (Stallings 2002). They have been used effectively to secure candid responses to sensitive questions, and can also more easily elicit responses from 'reclusive' audiences (Case 2008). Most importantly for this study, surveys and other quantitative research methods allowed replication (Austin & Pinkleton 2006), so the research could be effectively tested and used in different situations or at different times, thereby allowing useful comparisons.

This use of mixed methods will take advantage of the strengths of both approaches, "…triangulate data and illuminate statistical findings with, for example, case studies and/or vignettes..." (Lewin 2005). Use of a number of methods compensates for weaknesses in either method (Creswell & Plano Clark 2007). In addition, each step of the research will add further understanding to the disaster information seeking model, which suits the inductive and iterative approach of social constructivism (Creswell & Plano Clark 2007), the paradigm used as a basis for this thesis.

#### 3.2.2.1. Survey aims

The survey aimed to explore information seeking behaviour in order to make further adjustments to the disaster information seeking model developed in Chapter 3. Instead of establishing causal relationships within information seeking activity, this survey investigated what form the information seeking activity took by establishing which specific information seeking behaviour patterns were undertaken by respondents. In doing this, it contributed to answering the central research question of this thesis, which is:

*How do people look for information during the impact phase of an emergency?*

1. *Can information models, which are well established theory, be used to describe how people look for information during the impact phase of a disaster?*
2. *What information seeking patterns emerge from the impact phase of a disaster?*
3. *Can this knowledge extend known information theory and guide emergency agencies, as strategy as practice?*

The model, as it emerged after review of the interviews, is presented again in Figure 3.8.

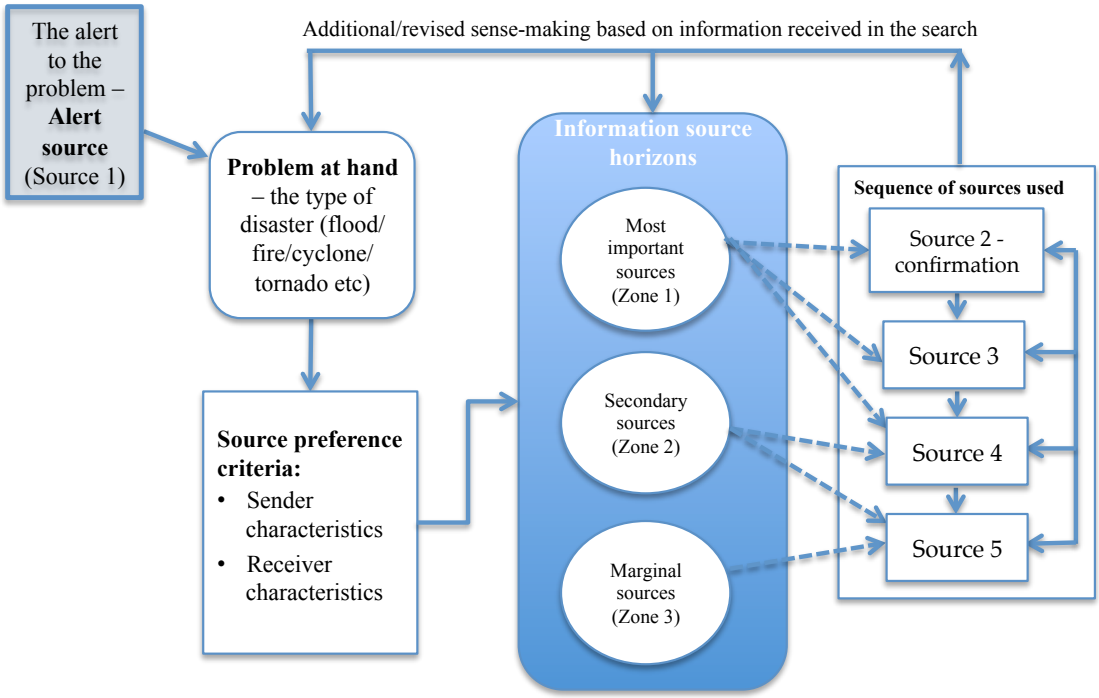



**Figure 3.8 A model of disaster information seeking, version 2**

#### 3.2.2.2. Survey design

The survey was designed to be completed online or in hard copy and returned to the researcher by reply paid post. Online data collection was selected because it was low cost, fast in terms of both data collection and entry, efficient, and it was able to cover a wide geographic area (Van Selm & Jankowski 2006). With few resources to support the survey, this was appealing for this project. In addition, it was likely to attract younger respondents (Kaplowitz, Hadlock & Levine 2004), and this was a positive characteristic for this component of the project, as the preceding interviews had demonstrated difficulties in securing respondents under the age of 25. However, online studies are recognised for their consistency in not producing a probability sample. The hard copy version was used because of recognised sampling shortcomings of online surveys, and the large proportion of people who do not have access to the web – in Australia this was almost 20% in 2011 (Australian Bureau of Statistics 2011).

Surveys and pilot studies are generally undertaken to determine the feasibility of a study and for testing an instrument (Teijlingen & Hundley 2001). In this case, the survey was conducted to add depth to the disaster information seeking model and to ensure the questions covered each aspect of the disaster information seeking model. The need to secure a large sample, and therefore illustration of a larger variety of information seeking behaviours, was a key feature of this phase of the study.

**Self administered online surveys**

Online surveys have been administered in four ways (Hoonakker & Carayon 2009, p. 350): built into an email message; sent as an attachment to an email message; attached as a self-executing file (.exe) to an email; and via a software that allows it to appear and be completed on the web, with potential participants provided a link to the survey. Data are stored on the server that hosts the survey.

In the past, online surveys were cumbersome and expensive to set up, but recent developments by online survey hosting companies have made the process simple and very cost effective (see, for instance, the websites of SurveyMonkey and websurvey). Web surveys, however, generally provide poorer response rates than other survey methods (Hoonakker & Carayon 2009; Manfreda et al. 2008;

Shih & Fan 2008; Sinclair et al. 2012) and suffer problems with sampling and nonresponse error (Hoonakker & Carayon 2009), as well as coverage error resulting from the younger and better educated profile of those more likely to use the web to complete a survey (Hoonakker & Carayon 2009). This technique is less effective for community surveys and should be combined with other methods to ensure both improved response rate and population coverage (Sinclair et al. 2012). In addition, online surveys do not have the potential to draw a sample from the whole population, as internet connection rates vary around the world – in Australia, 79% of the population over the age of 15 had accessed the internet in the 12 months before the development of the survey (Australian Bureau of Statistics 2012), while in India, 20% of the population had access to the internet in 2014 (Internet Live Stats 2014). Perceived lack of confidentiality by participants might also affect response rates, even though the researcher usually provides a guarantee that the results will not be traced back to individuals (Hoonakker & Carayon 2009).

Determining the nature and size of the population from which the online survey sample is drawn is also a dilemma for researchers. Even links sent to an email list that made up the initial population could be sent on to others to expand the population into unknown territory. "There is no way in which to know how many individuals might have seen the survey or its links but declined to participate. Only the number of completed surveys is known and not the number of refusals… " (Kaye & Johnson 1999, p. 326). It becomes impossible to determine the size of the sample in relation to the population and this becomes a problem when researchers try to use nonresponse rates to determine representedness of the sample (Kaye & Johnson 1999). Van Selm and Jankowksi (2006) and McDonald and Adam (2003) discounted the use of meters installed on web pages to count the people visiting in order to establish a population size, because, while a count of 10 might indicate 10 individual views, it might also mean that two individuals visited the site seven and three times each (Van Selm & Jankowski 2006). Related to this was the subsequent difficulty in undertaking the follow-up techniques that have been shown in telephone and mail surveys to be effective in improving response rates (Manfreda et al. 2008). Even if such follow-up were possible with every person who had the opportunity to complete an online survey, Manfreda et al. discovered that where this was possible in the past, the more often survey population members were contacted about an emailed survey, the greater the difference between the web and mail survey response rates (Manfreda et al. 2008).

Unforseen problems with internet-based surveys in the past have included reluctance of people on dial-up or other timed internet services to undertake an online survey because of the cost and/or speed of the connection for the duration of the survey (Evans & Mathur 2005), and a host server that was slow to update once respondents submitted, causing them to click on 'submit' a second time, thereby duplicating the response and artificially inflating the response number (Van Selm & Jankowski 2006). Improved internet access since 2006, however, may have reduced these problems in regions.

Despite these problems, there are features of online surveys that suit certain situations. Responses to online surveys are generally faster than any other form of survey data collection (Evans & Mathur 2005; Van Selm & Jankowski 2006), with responses possible within hours of making a link available and a reasonable sample of responses available within days (McDonald & Adam 2003). An important strength of online surveys was the lower rates of item non-response compared with other self-administered surveys such as mail, which occurred irrespective of the demographic characteristics of each respondent (Shin, Johnson & Rao 2012). Survey software now prevents participants from progressing until they answer the question, and survey designers can allow respondents to skip sections not relevant to them, based on answers they gave in previous questions (Evans & Mathur 2005; Van Selm & Jankowski 2006). The reach of online surveys is geographically uninhibited (Evans & Mathur 2005), which could be an advantage for many researchers. Higher quality responses to open-ended questions are also a feature of online surveys (Hoonakker & Carayon 2009; McDonald & Adam 2003). Online surveys allowed researchers to avoid entry of data and thereby eliminate possible errors in that stage of a project (Evans & Mathur 2005; Hoonakker & Carayon 2009). From the perspective of the respondent, online surveys appeal to some for their convenience, as surveys can be completed when it suits the respondent (Evans & Mathur 2005), rather than the interviewer.

For a survey designed to test an instrument, add insights to a model, to be part of a suite of methods, and where a representative sample was not the primary aim, the online method was considered the best option for this study. The potential for this method to gather a reasonable sized sample very quickly, its ability to secure a better response rate from respondents under age 25, and the reduced possibility

of item non-response were all characteristics that contributed to its selection for use in this project. The key feature of online surveys that was appealing in this context was the possibility via online survey of securing more than 200 responses. This would not have been possible using mail or hard copy surveys distributed in other ways.

**Self administered mailed surveys**

Printed surveys delivered or mailed to potential respondents have been a traditional method of data collection with demonstrated strengths and weaknesses. Mail surveys are inexpensive (Kindra et al. 1993) and more easily set up than face-to-face or telephone interviews, and require no training for interviewers. They provided a higher response rate than other forms when the questions dealt with sensitive or potentially embarrassing information (Kindra et al. 1993).

The significant weakness of many mail surveys is response rate. Research findings on response rates vary, depending on the target respondent group and design (Shih & Fan 2008; Shin, Johnson & Rao 2012) and other characteristics. Mail surveys amongst the general population are mostly recognised for their relatively poor response rate, 50% or below without extensive follow-up (Kindra et al. 1993). A meta study of comparison studies conducted prior to 2008 showed that overall, mail surveys had a better response rate (45%) than web surveys (34%) (Shih & Fan 2008). The low response rate in community surveys persisted whether the survey was personalised or not (Shin, Johnson & Rao 2012; Sinclair et al. 2012). One Australian survey (Sinclair et al. 2012, p. 5) of the general population that included no follow-up measured better return rates from personalised and generic mail (9.3% and 6.7% respectively) than the online versions of the survey, both personalised (2.9%) and generic (1.4%). The much higher cost telephone survey is the most effective with a return rate of 27.3 (Sinclair et al. 2012).

Pre-testing in mail surveys was necessary, because there was no avenue for clarification by respondent during a self administered survey (Austin & Pinkleton 2006) with the result that the survey should be well written so the questions were uniformly understood. Mail survey responses may also be prone to lower completion rates than other forms and mail responses were much

slower to be returned than internet-based responses (Truell, Bartlett & Alexander 2002).

The appeal of mailed surveys in this instance is the method's potential to attract a different demographic from other methods, especially online surveys. Kaplowitz et al. (2004) discovered that the mail version of a survey attracted older respondents than the online version. When compared with online surveys, mail survey respondents were more likely to be older, less wealthy, more likely to be rural residents and more likely to have finished their education at a younger age than those completing the online version of the survey (Shin, Johnson & Rao 2012). In addition, people of a certain demographic or social background can be targeted by selecting the geographic area into which mailed surveys are delivered (Wimmer & Dominick 2000). Self-completion mailed surveys are cheap to administer compared with telephone or person-to-person interviews, particularly if the sample is geographically dispersed (Bryman 2001; Cavana, Delahaye & Sekaran 2000; Wimmer & Dominick 2000). They are quick to administer because large quantities can be sent out at once and the bulk of responses are usually returned within weeks, although follow-up mail to remind people to complete and return the survey is advised, extending the time needed for maximum responses (Bryman 2001). Mailed questionnaires can be completed in the respondent's own time (Cavana, Delahaye & Sekaran 2000), and a key advantage of mailed interviews is, like the online survey, the absence of interviewer effects (Wimmer & Dominick 2000). Ethnicity, gender and social background of interviewers can affect the answers that respondents provide in face-to-face interviews (Bryman 2001). Social desirability bias may be exhibited when a researcher is present, where respondents give answers that they think might be more socially acceptable (Bryman 2001). Mailed questionnaires can provide anonymity (Wimmer & Dominick 2000). Self-completed mail interviews are also not susceptible to interviewer variability, where interviewers may ask questions in different order or in different ways, thereby affecting the outcome (Bryman 2001).

For several reasons, mailed surveys was a preferred technique for this study. A mailed questionnaire allowed targeting of potential respondents who were male and from a lower income and lower education background, a group that was hard to reach during the interview phase of the study. This group was also part of a demographic group that may potentially be susceptible to social desirability

bias when dealing with a university researcher. In addition, mailed surveys was a low cost option that allowed the researcher to access two geographical areas that would otherwise be difficult to reach. When combined with the online survey and in-depth interviews, it was considered a useful addition to the study.

#### 3.2.2.3. Survey sampling

While probability sampling has been achieved less in disaster research than in other areas of social science (Bourque, Shoaf & Nguyen 2002; Killian 2002), achieving representativeness was an aim of this study. The survey did not need to be so concerned with validity and reliability as the results were not be used to test hypotheses or draw conclusions about information seeking. Instead, it was used to plot possible information seeking pathways and to determine which information sources might be more important than others in order to further develop the disaster information seeking model. This model might later be tested with a survey that includes probability sampling in its administration.

Convenience sampling and snowball sampling were the methods selected for easy reach and the willingness of invitees to contribute (Cavana, Delahaye & Sekaran 2000). The survey was implemented in two ways: online and provided to potential respondents in hard copy for return mailing. The total number of returns, online and hard copy, were 348.

#### 3.2.2.4. Online survey

For the online survey, a link was set up in the online survey platform, SurveyMonkey, which hosted the survey and provided a link that could be sent to potential respondents. The link was then posted on August 17, 2012 on Facebook, LinkedIn and Twitter, and emailed to contacts of the researcher. Table 3.4, on the next page, details the potential sample size without a snowball effect.

**Table 3.4 Sample sources and potential sample size**

| Media | Numbers |
|---|---|
| Email | 116 contacts |
| Facebook | 231 friends |
| Twitter | 98 followers |
| LinkedIn | 199 connections |
| **Total** | **644** |

Reminders were emailed and posted into social media in September. The response rate to the online survey was 277 by the time the survey closed on October 30, 2012.

### 3.2.2.5. Mailed survey

In addition to the online survey, 2,000 surveys were printed into a six page document (Appendix 6) and included with a covering letter (Appendix 7) and a pre-paid reply envelope into an envelope. The intention with the mailed survey was to secure responses from groups that were under-represented in the pilot study, such as those with lower education completion and household income. For this reason, two Queensland suburbs, Gailes and Wilsonton, were identified as possibilities for a letter box drop of the survey, and research undertaken to investigate their suitability. Wilsonton is a suburb of Toowoomba and Gailes is a suburb of Brisbane. Figure 3.9 shows the location of the two mailbox delivery communities.


**Figure 3.9 Locations of Wilsonton and Gailes**

Australian Bureau of Statistics 2011 Census QuickStats series was reviewed for key data and included in Table 3.5. On closer examination, 151 households within the suburb of Gailes resided in the Camira statistical area, so Camira data was included in the table. Maps of the delivery areas within each suburb are presented in Figure 3.10 and Figure 3.11.

**Table 3.5 Demographic comparison of Wilsonton and Gailes with Australia (Australian Bureau of Statistics 2013c, 2013b, 2013a)**

| | Australia | Wilsonton, Queensland | Gailes Queensland | Camira, Queensland |
|---|---|---|---|---|
| Population | 21,507,717 | 5,986 | 1,646 | 7,391 |
| Age (median) | 37 | 38 | 35 | 34 |
| Tertiary educated (TAFE/University) | 21.6 | 13.7 | 13.2 | 16.7 |
| Income (median household weekly) | $1,481 | $864 | $936 | $1,448 |
| Number of occupied dwellings | 7,760,320 | 2,419 | 565 | 2,411 |

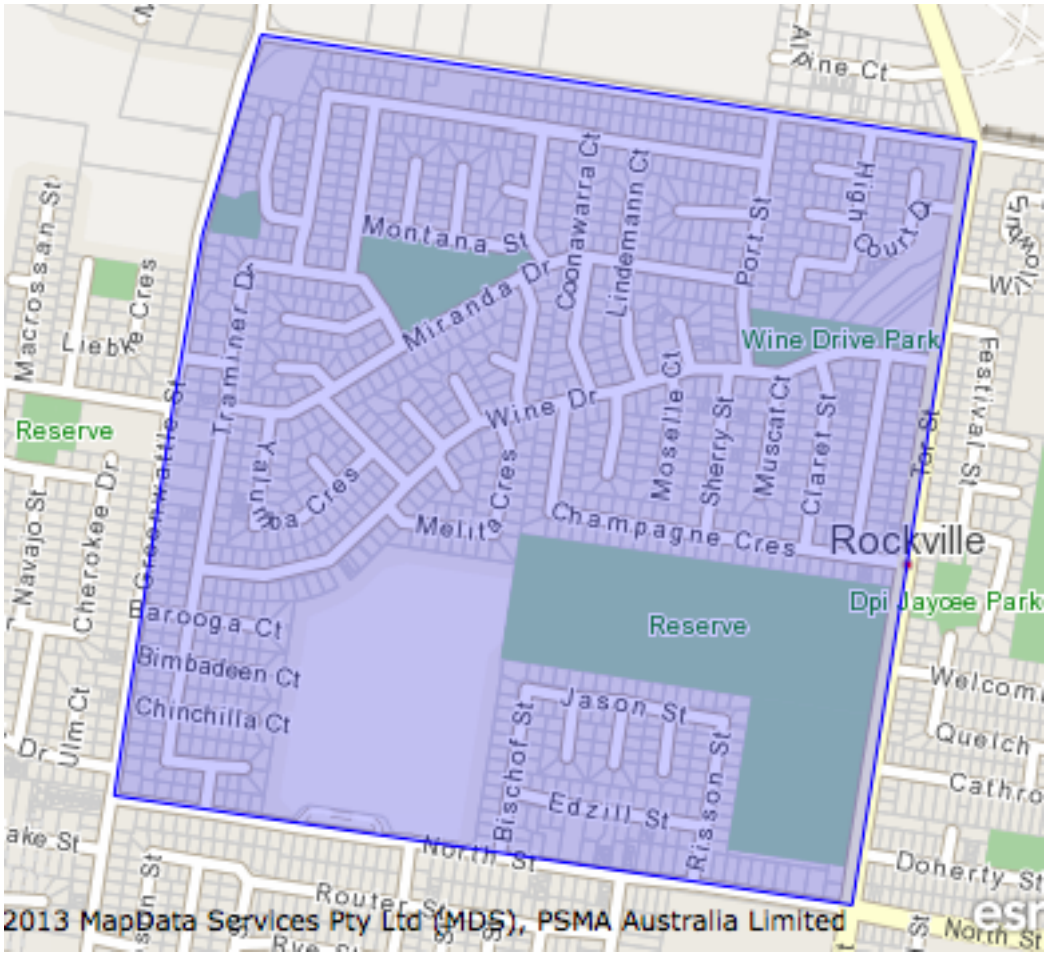



**Figure 3.10** **Wilsonton, Toowoomba, Queensland (Australian Bureau of Statistics 2013a)**

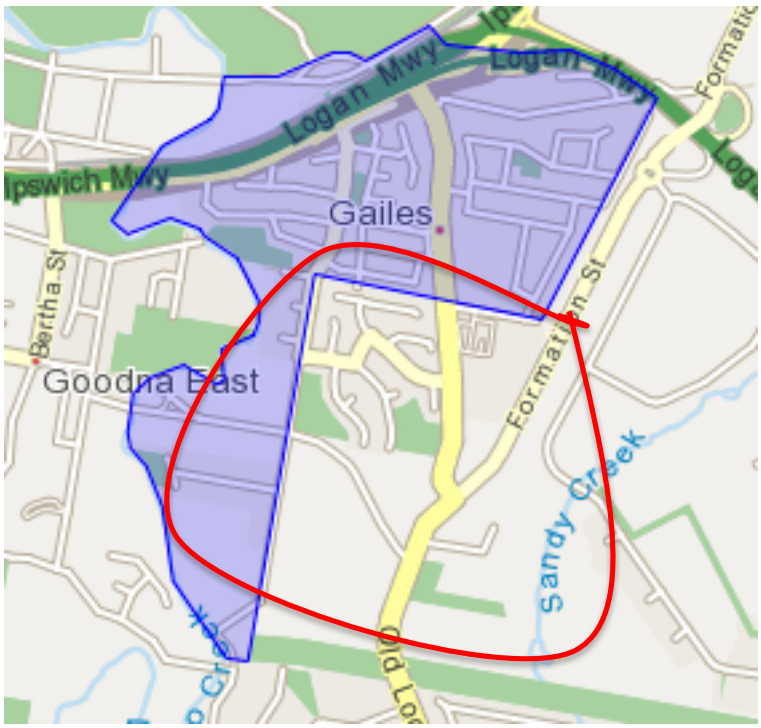



**Figure 3.11** **Gailes showing the portion contained in the Camira statistical area marked with the red circle (Australian Bureau of Statistics, 2011a)**

Of the 2,000 surveys printed and enveloped, 200 were kept for hand out by the researcher to potential respondents who emerged locally and the remaining 1,800 scheduled for delivery into Wilsonton and Gailes household letterboxes during the period September 3-7, 2012. The contractors delivering the surveys each received 900 surveys for letterbox-drop into each area. In Wilsonton, the instructions were to start at the northern end of the suburb and work south until all of the surveys were delivered. The Gailes surveys were delivered to the suburb of Gailes, including the segment that appeared in the Camira statistical area, which is circled on the map. The remaining 159 surveys were then delivered to the Camira houses closest to Gailes, just south of the target suburb and south of the circled area on the map. The streets they were delivered to were Melinda, Lorraine, Lacey, Hallett and Woodlands. Respondents were asked to return the completed surveys by September 21, 2012. Responses received were 26.

Snowball and purposive sampling was also used after an initial examination of the online survey results, which showed that the majority of respondents had experienced a flood. Cyclone and bushfire are the cause of significant disasters in

Australia, so an effort was made to find people who had experienced one of these two types of disasters. An email message was sent to the researcher's university bulletin board from which two responses were received from university staff who each had a relative willing to recruit respondents, one in Townsville for cyclone and one near Bega on the south coast of New South Wales for bushfire. A further 45 surveys were returned as a result, bringing the hard copy returns up to 71. The number of responses, online and mailed, were 348.

#### 3.2.2.6. Survey instrument

The literature review and interview phase of this study, as well as the preliminary disaster information seeking model, provided sound guidelines for the questions to be asked in a survey on information behaviour in a disaster.

Using a rational approach to questionnaire design in order to improve the construct validity of the instrument (Black 1999), a number of concepts were drawn from the literature and interview results and then sorted into clusters. These clusters also loosely aligned with each of the concepts contained within the disaster information seeking model. These were: demographic and situational factors, the type of disaster they experienced and its location and severity, the range of information sources and their sequence, the timing of information seeking, how people outside the disaster zone looked for information and what people were looking for.

Conventional research design will guide where each cluster is placed in the survey instrument. Iarossi (2006) found that warm-up questions were important. Easy, classification-type questions at the start of a survey can fulfill this function (Hague & Hague 2004). From this point in the survey, the questions should address the other clusters in the order they appear on the model.

The aim of the survey instrument was to allow generation of survey results that would contribute to the three research questions, and in doing so, add more depth to the disaster information seeking model developed in Chapter 2 and refined in Chapter 4.

**Survey questions on demographic and situational factors (classification data)**

Demographic information has traditionally been an important component of disaster research, allowing social scientists to scrutinize the representative levels of their sample, study sub-groups within populations, and to determine if there were relationships between demographic characteristics and behaviour. In this case, it is important because demographic information tells us about the many situational factors that inform the individual's source preference criteria, which is an important filter in the disaster information seeking model. Barton (1970) described the importance of collecting 'absolute', 'relational' and 'contextual' characteristics of individuals when undertaking disaster research. In the literature review, we saw that researchers have come to conclusions about behaviour based on gender (Drabek 1999; Enarson, Fothergill & Peek 2007; Lachlan, Spence & Nelson 2008; Procopio & Procopio 2007; Spence et al. 2006), age (Aguirre & Tierney 2001; Boyle et al. 2004; Drabek 1999; Fraustino, Liu & Jin 2012; Lachlan, Spence & Nelson 2008), education levels (Lu 2004), where they live (Bracken et al. 2005; Wray & Jupka 2004), disabilities (Fu et al. 2010), occupation (Hagar 2010), race and/or ethnicity (Bolin 2007; Lindell & Perry 2004; Wray & Jupka 2004), income (Phillips, Metz & Nieves 2005), experience (Blake et al. 2004; Donner, Rodriguez & Diaz 2007; Helsloot & Ruitenberg 2004) and family situation (Barata et al. 2004; Eisenman et al. 2007; Hayden et al. 2007; Lindell, Lu & Prater 2005).

From such research, conclusions have been drawn on certain aspects of disaster. For instance, people with disabilities tended to rely on wireless technology after an earthquake (Fu et al. 2010), and people with elderly relatives who did not want to move would delay evacuation (Eisenman et al. 2007). Other examples were that disaster would have different effects on those who live in poverty compared with the rest of the population (Enarson, Fothergill & Peek 2007), and similarly with the aged (Bolin 2007); and age and education have a relationship to media use in a disaster (Greenberg, Hofschire & Lachlan 2002). The concept of vulnerability is founded on the demographic and social situations of communities in a disaster (Enarson, Fothergill & Peek 2007). Demographic data collection was therefore important during this survey.

In structuring questionnaires, demographic data is recommended to start the survey because it requires easy answers that allow the respondent to get into the flow of the survey (Cavana, Delahaye & Sekaran 2000; Lewin 2005). For this

reason, the first set of questions asked in the survey was demographic, even though one of the questions, income, could be sensitive. It was decided that this would be one of the last of the demographic questions to be asked to reduce the possibility that respondents would quit the survey at that point.

The global nature of online surveys suggested that there could be a geographic spread amongst respondents, so the first two questions related to the country where respondents lived and, if in Australia, the postcode. The postcode would enable both the state and region to be identified in analysis. The questions were:

Q1. What country do you live in? (answer: Australia, other).

Q2. If you live in Australia, what is your postcode? (open response).

Question 3 asked about age, and respondents were able to select an age category. The categories were based on the Australian Bureau of Statistics (ABS) age reporting mechanism in which ages were reported in five year brackets such as 25 to 29, 30 to 34 and so on (such as those found in Australian Bureau of Statistics 2013a). To reduce the number of choices and ensure the survey tasks remained clear within the instrument, the online survey age brackets were condensed into five choices, based on summaries of age data that the ABS has used in data summaries in the past (for example, Australian Bureau of Statistics 2007b), which categorised the ages as 0-4 years, 5-14, 15-24, 25-54, 55-64 and 65 plus. This research was not aiming to capture the recounts of children, so the first two categories in this summary were discarded. Because of differences between younger people (i.e. Generation Y) and older people in their information seeking patterns (Weiler 2005), it was considered useful to keep the under 25 age group separate from others. The third group in the ABS summary, 25-54, was considered too large a spread of age to be useful, and for the survey was split into two, 25-39 and 40-55. Similarly with the older age groups, instead of 55-64 and then 65 plus as used in ABS summaries, 55-70 was used in an effort to incorporate older and more active people and 71 plus used as the final category to capture the more frail and dependent elderly. This was based on survey results from the United States in which the average age nominated by respondents (n = 2,969) at which people became elderly was 68, and in which people over the age of 65 (n=1,306 or 44%) considered 74 to be the threshold at which a person became elderly (Taylor, P. et al. 2009, p. 21). Because the average of 68 years was not the cutoff for an ABS category, it was decided to select the appropriate cut off between the two ages, 71, for use in the survey as 71+. It was

understood that while the United States data could not be considered reflective of an Australian sample, it provided a guide in the absence of Australian equivalent information. The question included in the survey was:

Q3. What category below includes your age? (Answer: Younger than 25, 25-39, 40-55, 56-70, 71+).

Gender emerged from disaster behavior literature as a standard data set because of the differences between the activity of men and women in a disaster (Enarson, Fothergill & Peek 2007; Lachlan, Spence & Nelson 2008). Question 4 was:

Q4. What is your gender? (Answer: male, female).

Family situation in disaster behavior research was found to affect the way people acted in different stages of the disaster (Drabek 2001; Eisenman et al. 2007; Van Willigen et al. 2002), so it was legitimate to explore whether family situation could also affect information seeking behavior. In addition, the pilot study discovered that the location of family was information consistently sought by participants. For this reason, questions 5-7 related to family situation. Question 5 asked about partnership status, question 6 about the number of people in the household, and question 7 about the number of dependents, including children, elderly or disabled people. The questions were:

Q5. What is your partnership status? (Answer: married or in a partnership, single or divorced).

Q6. How many people live in your household? (Answer: 1, 2, 3-4, 5 or more).

Q7. How many of these are dependents (children, elderly, disabled)? Select one. (Answer: none, 1-2, 3-4, 5 or more).

In some studies, links have been drawn between community vulnerability, the associated strength or weakness of social networks, and education and income levels (Barton 1970; Eisenman et al. 2007; Taylor, K. et al. 2009). Education and income have also been explored as predictors of certain behavior (Boyle et al. 2004). Therefore, question 8 asked about education, allowing respondents to select from one of five levels. Question 9 asked about household income, which researchers found was linked to evacuation rates (Eisenman et al. 2007; Taylor, K. et al. 2009). There were four options, based loosely on ABS groupings of income, but reduced for simplicity and informed by other indicators. For instance, the lowest level, $30,000, was developed from the Melbourne Institute of Applied Economic and Social Research poverty line income for a family of two adults and

two children (2012). This level of $31,169 per annum was rounded down to ensure the survey remained simple and easier to fill in. The questions and possible answers were:

Q8. What is your level of education? Select one. (Answer: Up to Year 12, Tertiary TAFE or other, Tertiary university).

Q9. What is your yearly household income? Select one. (Answer: less than $30,000, $30,000-$80,000, $81,000-$100,000, $100,000+).

The education and income questions have potential to become a point where item non-response can occur, and in some cases, prompt respondents to stop filling in the survey (Hague & Hague 2004; Iarossi 2006). This is the reason they were included last in the classification data, before the survey moved into questions about disasters and disaster behaviour.

The literature review showed that there were differences in disaster reactions and information seeking between those in urban areas and those in rural areas (Chesser et al. 2006; Miller et al. 2012). The interviews conducted in the pilot study did show differences between types of communities, but the type of disaster might also have caused these differences. Therefore it was important to include some indication in the survey that allowed comparisons to be made between rural, regional and urban areas. The classifications reflected those used in the Miller et al. research for Pew Research Centre (2012, p. 6), which were 'rural area', 'large city', 'suburb near a large city', 'small city or town'. The question was:

Q10. Identify the type of area you live in? Select one. (Answer: city/suburban, semi-rural, rural).

Also important to determine was whether the respondents had experienced a disaster in the past and the type of disaster they were using as a reference while they completed the survey, so question 11 related to disaster experience. In the literature, disaster experience was a situational factor that seemed to affect subsequent disaster behaviour, so this question was included to explore this further.

Q11. Has your community experienced a disaster in the past two years? (Answer: yes, no).

Those who answered this question with "no", with no recent experience of a disaster, were asked to go to directly to question 14, which started the questions on what they thought they would do if they were in a disaster – these are explained in section 3.3.5.6.2.

**Survey questions on disaster type and severity**

At that point of the survey, the respondents were automatically directed to different sections of the survey, depending on their experience. Those with disaster experience continued on to question 12, asking them to describe the type of disaster. Disaster type occupied a central position in the model, which was confirmed by the interviews as having some influence on subsequent information seeking behaviour. The options from that point had been drawn from the literature review on natural disasters that could affect Australia and included sudden storm, bushfire, flash flood, slow flood, earthquake, cyclone/hurricane/typhoon and tsunami. The question was:

Q12. What was the most recent disaster your community has experienced? Select one. (Answer: Sudden storm, bushfire, flash flood, slow flood, earthquake, cyclone/hurricane/typhoon, tsunami).

Before they reached question 14, those respondents with experience were asked to indicate the severity of the disaster to them personally in question 13. Severity has been measured in terms of lives lost, property lost, physical damage and a number of other factors that can differ in definition across disasters and across geographical boundaries (Quarantelli 1998). It had also been mentioned in disaster literature as one of the situational factors that might have an effect on disaster behaviour. In this case, whether or not the respondent was ordered or asked to evacuate was used to determine the level of impact the disaster had to the individual respondents and their proximity to the disaster. The question was also carefully worded to ensure that evacuations that respondents were reporting were ordered or requested by officials involved in the incident, rather than self evacuation. This helped account for differences in understanding across members of the community about the level of threat and allowed the researcher to standardize the level of threat to each respondent.

Q13. Were you asked by agencies to evacuate your home or workplace? (Answer: yes, no).

**Survey questions on information seeking**

From question 14 onward, the survey progressed to information seeking behaviour. These questions were based on similar questions asked by Savolainen in testing his model (2008a, 2010). The sections of the model addressed by these questions were those relating to the first alert, the confirmation source, importance of sources and sequence of source use. Those survey respondents who had no recent experience in a disaster were asked what they thought they would do in a specially worded stream of the same questioning. Question 14 asked how people first heard about the disaster, their first alert, and question 15 asked people to identify their confirmation source. The selections for both of these closed questions were developed from the answers that the interviewees gave in the interview study. They were:

Q14. How did you first become aware of the disaster? Select one. (Answer: Direct contact with friends, family, neighbours – face-to-face, phone calls/texts, Skype etc.; indirect contact with friends, family, neighbours – email, social media; Seeing the disaster such as water or smoke; personal contacts in emergency/council agencies or staff in the field; emergency agency social media; emergency agency or council website; agency emergency text/phone message; radio; television; newspaper; news or weather website).

Q15. Where did you THEN turn to for more information? Select one. (Answer: Direct contact with friends, family, neighbours – face-to-face, phone calls/texts, Skype etc.; indirect contact with friends, family, neighbours – email, social media; Seeing the disaster such as water or smoke; personal contacts in emergency/council agencies or staff in the field; emergency agency social media; emergency agency or council website; agency emergency text/phone message; radio; television; newspaper; news or weather website).

Only the alert source and the confirmation source were pursued in the survey, even though the interviews did, and the model has the potential to, map pathways of information seeking in a disaster consisting of more than two sources. The reason for this was that the complexity of some of the questions, given that some had more than 11 possible answers to choose from, was of concern relating to the extraction of the pathways at data analysis stage. Complexity of questions or their answers can also reduce response rates (Cavana,

Delahaye & Sekaran 2000). These two problems led to the decision to collect data on just the first alert, the confirmation source and the most important sources.

The next question asked people to identify their most important sources of information on a Likert scale, where 1 was of no importance and 5 was a most important source. In this question, respondents rated each of the selections that appeared in the previous two questions, and from this question, number of sources could be calculated. The Likert scale format was used to attempt to capture the degree of importance of each source, in a similar way that the diagrams did during each of the interviews. The question was:

Q16. Which information sources did you come to rely on the most? Please rate each of these sources 1 to 5 in terms of importance, where 1 was of NO importance and 5 was MOST important. Circle one number for each source. (Answer: Direct contact with friends, family, neighbours – face-to-face, phone calls/texts, Skype etc.; indirect contact with friends, family, neighbours – email, social media; seeing the disaster such as water or smoke; personal contacts in emergency/council agencies or staff in the field; emergency agency social media; emergency agency or council website; agency emergency text/phone message; radio; television; newspaper; news or weather website).

During the interviews phase of the study, virtually all respondents referred to 'other people' as a source, and the interviewer found it necessary to ask how they contacted these other people. Their answers supported two themes – one in which other people were direct and synchronous sources such as on the phone or face-to-face; the other where other people were sources more indirectly and asynchronously such as via email or social media. These two 'other people' sources were separated in the survey into separate choices in all of the information sources questions. In addition, the interviews and one of the Australian articles in the literature review (Cohen, Hughes & White 2007) revealed that some people, mostly in rural communities, used personal contacts within agencies or the local council for information, particularly in a bushfire or flood situation. Personal contacts were included as responses for the three information source questions.

Also emerging from the interviews were clusters of web-based information sources that indicated that these should be used as discrete information source

choices in the survey. The Bureau of Meteorology, other weather websites and news websites were key sources mentioned in interviews, with agency websites and agency social media sites clearly separate sources with different uses. Many studies in the literature review referred to all of these sources in one group, the internet (Jones & Rainie 2002; Spence et al. 2006; Spence et al. 2005; Stempel III & Hargrove 2000; Stempel III & Hargrove 2002). In addition, the interviews phase of this study showed that media was viewed as two separate groups of sources, local or non-local, and that this made a difference to media consumption patterns in the disasters studied in the interviews. This was particularly the case in rural and semi-rural areas. However, separating the mainstream media outlets into local and state/national resulted in a potential 15 choices for the information seeking and source importance questions, so these remained amalgamated into one choice for each mainstream media source-type.

'Other people' were a recurring theme in the interview study, so it was evident that more information was needed on how others were used by survey respondents. Question 17 achieved this by asking, if, in the previous question, people nominated 'other people' as an information source of somewhat, very or most importance, how they communicated with them. Again, the choices were derived from the responses of the people interviewed in the earlier in-depth interviews – landline, mobile telephone (voice); mobile telephone (text); email, social media, Skype or similar; or face-to-face. Another reason for including this question was the emergency management industry's interest in social media as an information source for the community (Perkins 2010; and see sites such as Emergency 2.0 Wiki Project). This question aimed to show whether social media contact with other people rated as a key information source, along with the information gleaned from question 16's rating of each source. The question was:

Q17. In the previous question, if you gave friends, family or neighbours a rating of '3' or more, how did you mostly communicate with them? Select 1. (Answer: landline telephone, mobile telephone voice, mobile telephone text, email, social media, Skype or similar, face-to-face).

The temporal aspect of information seeking emerged as a factor that differed across locations in the interviews so question 18 asked about the time delay people experienced before they looked for more information. Again the answer selections were developed from responses provided during the interviews. The questions was:

Q18. Once you heard about the disaster, how long was it before you looked for further information? (Answer: less than one hour, 1-2 hours, 2-4 hours, one day, more than one day, more than several days).

Finding out what people were looking for was the subject of question 19. From the interviews, 18 possible responses had emerged, such as checking on family, checking on friends, road closures, what had happened, what was going to happen and so on, plus 'other' for those who believed their answer did not belong to any of the clusters identified. Appendix 5 provides a full list of what people wanted to know in the interviews. There was also a very good chance that possible answers had been overlooked and that the 'other' response would yield a wide range of possibilities, making the end result unwieldy for analysis. It was decided to cluster the possible answers into themes so that this question could be condensed. The themes were based on the emergency management practice of basing information on four principles – what has happened, what is going to happen, what you (the individual) should do now, and what you (the individual) should do next):

Q19. If you did look for more information, what were you trying to find out? Please rank from the most important (1) to the least important (4). (Answer: What has happened? What is going to happen? What should I do now? What should I do next?).

### 3.2.2.7. Survey implementation

The survey was developed online using the subscription service, SurveyMonkey. Once the survey was set up, a link was provided to the survey for the researcher to send to the sample. The survey opened on August 16, 2012 and closed on October 30, 2013. Once the survey was closed, data was downloaded from the host server into SPSS for analysis. The mailed survey was delivered September 3-7, 2012. Data from mailed survey responses was entered into SPSS using the fields established by the online software.

### 3.2.2.8. Survey analysis

The survey analysis and results will be reported in detail in Chapter 6. Chapter 6 will also discuss factors that may affect the format of the disaster information seeking model and will map these onto a new version of the model. From this

point, Phase 3 of the research, the validation focus group, was undertaken using the new version of the model as a discussion point. We will now move into the details of the focus group implementation.

### *3.2.3. Phase Three: Focus Group*

The interviews and survey undertaken so far have contributed useful information to guide the development of the disaster information seeking model. However, further validation of the model was required before it could be used as a legitimate instrument. Focus group was the method selected for this step because focus groups have relatively high face validity, they produce quick results (Case 2008), and the use of a group to stimulate ideas and recommendations was considered important (Lindlof 1995). Focus groups can be susceptible to power imbalances (Cavana, Delahaye & Sekaran 2000), but there seemed to be no power imbalances within the group of potential participants for this study. In addition, it was important to test ideas emerging from the disaster information seeking model that could be investigated in later research (Wimmer & Dominick 2000) and therefore to allow flexibility in the questioning (Wimmer & Dominick 2000), even though the disaster information seeking model itself provided quite a rigid structure for the session.

#### 3.2.3.1. Focus group aims

The aim of this focus group was to determine if the disaster information seeking model might support research that would explain information seeking in a disaster and therefore might provide a template for disaster communication.

#### 3.2.3.2. Focus group structure and process

Focus group participants were recruited from the membership of an Australian organisation, Emergency Media and Public Affairs (EMPA). Members of this organisation are emergency and disaster communication practitioners for emergency and recovery agencies, and researchers in the field from universities across Australia and New Zealand. The researcher for this project wrote to the EMPA Board of Directors asking for assistance in recruiting participants. Two of the board members and two conference committee members volunteered, and four others were introduced to the researcher by the Board Secretary for further contact. The aim was to recruit eight participants; six participants accepted the invitation to be involved and all took part on the day.

The profile of the participants was:

- 50% female;
- two were disaster researchers, four were disaster communication practitioners;
- one was employed by a university, two were self employed, two were employed by response agencies, and one was employed by a response consultancy;
- in their work roles, five were concerned with the response phase of disaster and one with the recovery phase;
- all were in the age range 40-55;
- all had been involved in emergency/disaster communication and/or research for more than five years.

The focus group was held at the ParkRoyal Hotel, Darling Harbour, Sydney, Australia, on Sunday May 31, 2015. It went for 1.5 hours. All of the participants were known to each other except the university researcher, so the atmosphere was already relaxed and conversational and inclusive of the researcher, so it was considered that the usual 'breaking the ice' question was not needed. Participants were sent during the week before the focus group a package of information to familiarise them with the model and its origins, as well as the list of questions to be considered at the focus group. Contents of this package were reproduced for the focus group members and distributed on the day. The questions loosely followed this format and addressed each element of the model:

1. What was your overall impression of this model as an attempt to explain how people get information in a disaster?
2. Key questions:
    a. How appropriately is the alert source dealt with here?
    b. How relevant to you think the situational factors are to how people look for information?
    c. How relevant is 'influences on source selection' filter?
    d. What do you think of the information zones and importance of sources concept?

e. What do you think of the source sequence component?

f. How relevant is the feedback loop here?

3. Do you have any overall comments about the model?
4. Is there anything I haven't talked about that you'd like to comment on or ask about?

#### 3.2.3.3. Focus group results and analysis

The results of the focus group and the analysis of the data collected will be detailed in Chapter 7. Chapter 7 will adapt the disaster information seeking model from the findings and will finalise the model for this study.

## 3.3. Limitations of the research methods

There were a number of limitations surrounding methods chosen.

### *3.3.1. Interviews*

The shortcomings of interviews were that each interview provided a glimpse of only one person's reality (Case 2008, p. 217) and even the information provided by 10 participants may not represent the rest of the population that the sample was purported to represent. This was acceptable for use in this three-phase study and was addressed in some way by the survey, described in the next chapter. Chapter 5. Interviewer bias may have occurred, and some questions may have been asked of some participants and not of others (Wimmer & Dominick 2000, pp. 122-3), reducing the ability of researchers to replicate the study. This was addressed by structuring the interview and adhering to this structure where possible, and careful development of questions to prevent guidance or leading (De Poy & Gitlin 1998, p. 93). However, the inexperience of the interviewer did lead to problems in the software analysis of the interviews where sometimes a follow up question was phrased in a leading way instead of leaving the question open for the respondent. For example, a respondent may have mentioned that he switched on "the news". Instead of following up by asking the respondent what media and what channel, the interviewer asked if he meant ABC radio. The result of this was that this instance of ABC radio did not appear in the response, but

instead appeared in the interviewer's utterances, which were tagged as such by the software and dealt with in a different way to utterances by the respondent.

Other problems arose from the necessity to recruit participants via snowball and convenience sampling, which were both non-probability sampling methods and reduced the reliability of the method (Austin & Pinkleton 2006). However, the exploratory and inductive nature of the entire study mitigated this limitation, as issues needed to be canvassed before any attempts at generalisation. In fact, generalisation will only be possible in future studies, after the completion of development of the disaster information seeking model.

Timing of the interviews could also have been a limitation. The Gerogery bushfire interviews were conducted 12 months after the event, the Airlie Beach cyclone interviews conducted six months later, the St George slow flood interviews conducted seven months afterward and the Toowoomba flash flood interviews conducted almost eight months after the event. The reason for the concern about the timing was documented by a number of researchers who said that data collected more than six months from the event impact become unreliable or "perishable" (Bourque, Shoaf & Nguyen 2002; Bourque et al. 2007; Killian 2002). Stallings (2007, p. 57) noted that "timing is paramount in disaster field studies". While it was desirable to collect the data sooner after the disaster, lack of resources prevented this from occurring.

### *3.3.2. Survey*

The limitations of the survey were centred on the distribution of respondents across disaster types, which were clustered around flood and to a lesser extent, bushfire and cyclone. This prevented the maximum number of different types of information seeking behaviours being reported by respondents. In addition, the question relating to what people were looking for was poorly worded and structured, resulting in little meaningful information being extracted in the analysis stage of this method. In an attempt to simplify the question, the detail of what people were trying to find out was lost, and general themes substituted instead that would not be helpful in plotting information seeking behaviour.

Even though the survey data was not to be used for making generalisations about disaster information seeking behaviour, the sample profile was also a

limitation. The purpose of the survey was to draw out possible information seeking pathways, which it did very effectively, but the profile of the sample lead to questions about maximum possible behaviours were represented, given the skew towards older, educated, females living in regional areas.

### *3.3.3. Focus group*

The limitation of the focus group was that the dynamics of the group combined with the topic of the session lead to domination of the conversation by the disaster communication practitioners. However, the two researchers in the group did make substantial contributions, and their contributions tended to be high quality. The imbalance did not seem to be caused by power structures, as the practitioners seemed very interested in what the researchers said and vice versa, and the researchers contributed at appropriate times to the session. The practitioners had great experience to draw from and their stories illustrating their points were recent and relevant.

## 3.4. Ethics

Every stage of a program researching human behaviour has ethical issues attached, mainly because any relationship between a respondent and a researcher is designed to benefit the researcher (Cavana, Delahaye & Sekaran 2000, p. 21). In disaster research, discussion on issues have not been resolved relating to the ethics of engaging in research in which the participants might be 'decisionally impaired' or 'vulnerable' after a disaster-generated trauma (Levine 2004; Rosenstein 2004) has been undertaken, but issues not resolved (Rosenstein 2004). Rosenstein's discussion on people who had experienced severe stress that impaired their ability to make decisions (and therefore affected their judgement when approached to be part of research) centred on severely traumatic events, such as terrorist attacks. Levine's (2004) discussion, however, looked at vulnerability being a more general state that might exist before the vulnerable individuals experienced a disaster (2004). In disaster research, the central ethical question is whether the research will pose risks to respondents (Kilpatrick 2004), even though there is a major gap in the knowledge on this and how it might occur (Collogan et al. 2004).

The research for this project involved respondents who experienced what could be considered in Australia conventional disasters, disasters that were expected

and do occur every year somewhere in the country. They were also low on the trauma scale – in three of the interview locations, damage was to property and only a few households in each community were evacuated, if at all. So little research has been undertaken on the effects of research on people who have experienced a disaster, that there exists no means of determining the levels of trauma to individuals according to the type and severity of the disaster. This meant there was very little to work on when preparing research in this field and in the four identified communities for the interviews.

### *3.4.1. Ethics management for the interviews*

Researchers who conducted interviews with the survivors of the 2003 Canberra bushfires, which was one of the more traumatic disasters in Australian history in which four people died, discovered that talking about their experiences to researchers was helpful for many of the research participants (Nicholls 2010, 2011). None reported any deleterious effects from their interviews. However, disaster survivors do suffer psychological effects (Bourque et al. 2007; Wraith & Gordon 2006), so any research that revisited the catalyst of those effects should be treated carefully.

Full participant consent was secured from each of the interviewees: implicit consent was granted when making an appointment for the interview, and then respondents were asked to fill in and sign consent form before the interview started. They were also asked if they consented to the interview being recorded – all of the respondents agreed to this in writing. Each respondent was also directed, both in writing and verbally during the introduction to the interview, to the services of Lifeline, a not-for-profit telephone counseling service experienced in post-disaster counseling. This was in the event that the interview triggered anxiety or trauma stemming from recalling the disaster.

The researcher successfully completed all three sections of the University of South Australia ethics protocol and was granted ethical clearance by the University of South Australia's E1 Community Review Group to conduct the interviews with members of the subject communities. The ethics application for the interviews was considered by the E1 Community Review Group to meet the requirements of the National Statement on Ethical Conduct in Human Research. The University of South Australia ethics protocol number was 0000020855.

### *3.4.2. Ethics management for the survey*

As was the case with the interviews, full participant consent was received from participants of the surveys. This was secured in the form of the participation of each respondent, which was voluntary in the absence of the researcher. Each respondent received the covering letter before proceeding with either the survey online or the mailed copy of the survey. They were assured that the survey was voluntary, and directed to the services of the Lifeline telephone counseling service if any trauma was triggered by participation in the survey. A copy of the survey cover letter is attached in Appendix 7.

The ethics application for the survey was considered by the E1 Community Review Group to meet the requirements of the National Statement on Ethical Conduct in Human Research. The University of South Australia ethics protocol number was 0000020855.

### *3.4.3. Ethics management for the focus groups*

Each of the six participants of the focus group signed a consent form and, at the start of the focus group, verbally agreed to recording of the session. The participants agreed that they understood that they could withdraw at any time without consequence, and one participant did leave to meet another commitment before the end of the session.

The ethics application for the focus group was considered by the Design and Social Context College Human Ethics Advisory Network, a subcommittee of the RMIT University Human Research Ethics Committee, and approved for implementation. The project number was CHEAN A 0000019278-03/15.

### *3.4.4. Data storage and management*

The data collected during the course of this project will be stored in a secure place and retained for five years from the date of collection.

#### 3.4.4.1. The interviews

The interviews were recorded and transferred onto computer into .aac files, and transcripts of the interviews developed and stored in the same place. File names and document titles were developed so that interviewees could not be identified from such tags, and within the documents, each respondent was allocated a file number that reflected the location (e.g. AB for Airlie Beach), a letter denoting sex (eg F or M) and a number denoting the order of the interviews (e.g. the fifth female = 5). This resulted in a tag that looked like this: ABF5 (Airlie Beach, female, fifth interviewed). In addition, the transcripts were stored in Leximancer, and no other parties were able to access either the password protected electronic files or hard copies of any of the interview material.

Backup copies of the transcripts were stored on an external hard drive and both the computer and hard drive were password protected. A backup CD copy of the transcripts, survey data and the final thesis was generated. The paperwork associated with each interview, such as the background survey and the source horizons illustration, will kept in a locked cupboard until it is destroyed.

#### 3.4.4.2. The survey

The online survey results were downloaded from SurveyMonkey into an SPSS file, where the only identifier of each respondent was the IP address of the computer at which the person filled in the survey. Backup copies of the SPSS file were stored on an external hard drive and both the computer and hard drive were password protected.

#### 3.4.4.3. The focus group

A recording of the focus group was taken and a transcript developed. Copies of the electronic files were stored in password-protected locations in the researcher's office. The printed copy of the transcript was kept in a locked cupboard for the retention period.

## 3.5. Summary of the methodology

Social constructivism was selected as the paradigm to guide this research because of its capability to accommodate inductive and iterative approaches, its acceptance that reality changes and that culture has an effect on reality, and because it is a paradigm in extensive use by communication and information seeking researchers, Savolainen in particular. This chapter detailed the research methods to be used – semi-structured interviews, which were analysed qualitatively and quantitatively, a survey, which was analysed qualitatively, and a focus group that was also analysed qualitatively. Also outlined in this section were the ethics and data management processes that were applied to this project.

The next chapter, Chapter 4, provides detailed results and analysis of the data collected in a series of interviews across four communities that had experienced a disaster in the previous 12 months. This chapter will use the disaster information seeking model as a framework for the interviews, the data from which will be used to further develop the model.

Chapter 5 will describe the results and analysis of a survey, leading to a refined version of the model. Chapter 6 will describe results of a focus group that was undertaken to determine the model's practicality for emergency managers, and how these results can contribute to adaptation of the disaster information seeking model.

# 4. Phase one: semi-structured interviews

The previous chapter, Chapter 3, explained the research frameworks and methods that were used in this study, showing that social constructivism will guide mixed methods research. The first research method used within this project was semi-structured interviews, which provided the foundation for a survey and focus group. This chapter describes and analyses the results of these interviews and compares these results against the disaster information seeking model that was developed in Chapter 2. Enhancements were made to the model to reflect the findings of the interviews. An updated version of the model is presented at the end of the chapter. Figure 4.1 charts this approach.

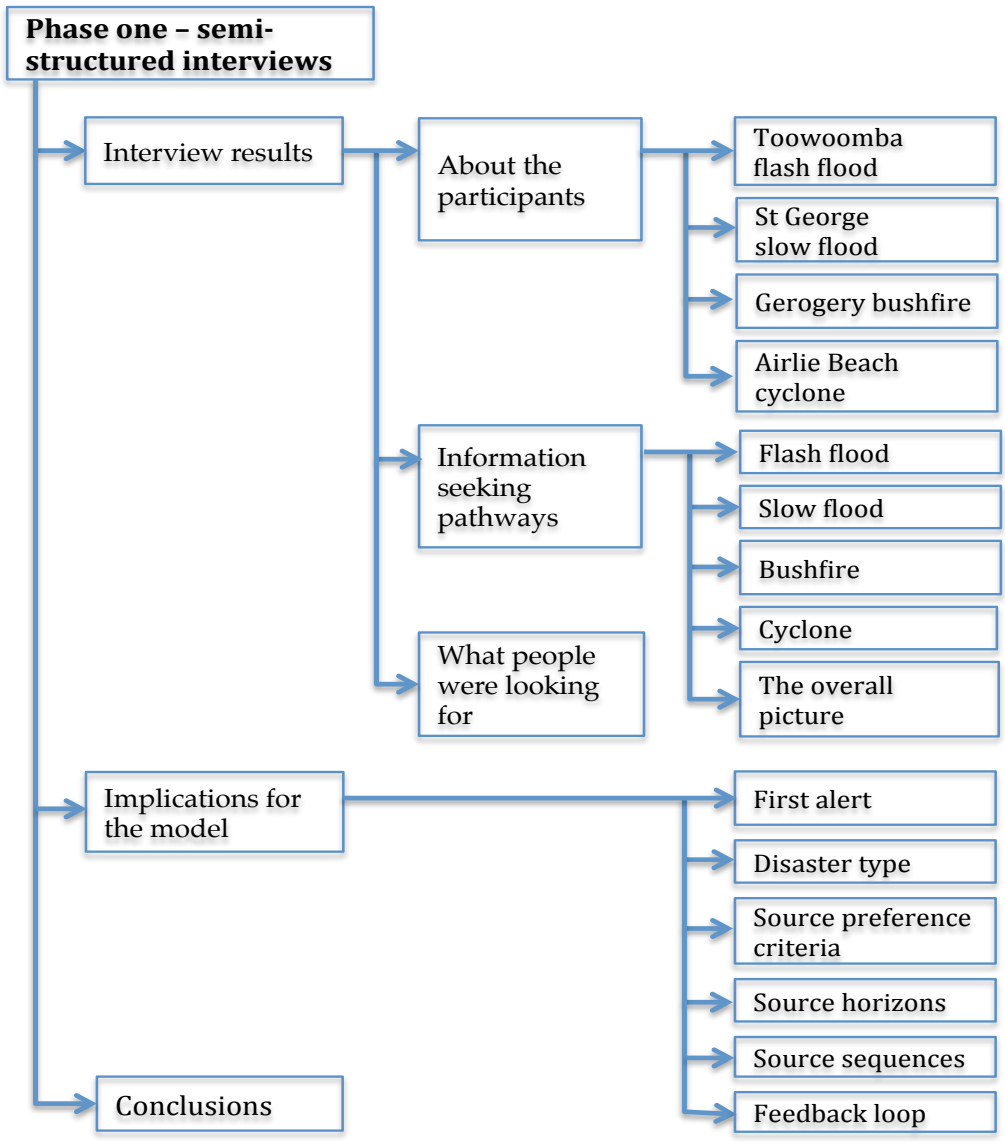



**Figure 4.1 A map of Chapter 4: Phase one – semi-structured interviews**

## 4.1. Interview aims

The interviews aimed to do three things:

1. To discover information seeking behaviour for comparison with the model developed in Chapter 2;
2. To determine whether the disaster information seeking model presents a reasonable framework for research in this field; and
3. To use the outcomes to develop a valid survey instrument for future review of the model.

## 4.2. Interview methodology

Interviews were selected as the first research method for this study because they facilitate discovery (Austin & Pinkleton 2006) and provide information rich in scope (Maxwell 2012; Petty, Thomson & Stew 2012). In addition, they were the primary research method used by Savolainen, the developer of the ELIS model on which the disaster information seeking model was based (2007b, 2008a, 2010). The interviews for this study were conducted with 51 people in four disaster-affected communities in eastern Australia, covering bushfire, cyclone, slow flood and flash flood. These incidents were selected because of their timing (within the 12 months before the interviews) and the ability of the researcher to access the affected communities. The interview transcripts were analysed using thematic analysis for similarities and differences with the disaster information seeking model developed in Chapter 2. More statistical analyses was rejected on the basis that this was exploratory research, the sample sizes would be too small to show effects, and that the interviews were aimed at discovery rather than quantification. Features emerging from this analysis were used to further develop the model. The manual analysis was compared with the results of computerised thematic analysis (using the program Leximancer) to pinpoint strengths and weaknesses in the initial manual analysis and to further enhance, if necessary, the model. Detailed explanation of the analysis techniques was presented in Chapter 3.

## 4.3. Interviews results

The interview stage revealed a wealth of information from a broad cross-section of each of the subject communities. The information from the interviews was used to plot a range of information seeking behaviours that could be compared

with the disaster information seeking model that was developed from the literature review. The interviews also provided a great deal of information that was used to guide survey questioning and provide a broad range of answer selections for survey participants.

The literature review showed how the type of disaster determined both how people first heard about the disaster and how they then sought information. Because the locations of the interviews were selected partly for the type of disaster, the results will be presented by type for simplicity, with a summary provided at the end of the section. First, a profile of all of the interview participants will be developed before examining their responses.

### *4.3.1. About the participants*

#### 4.3.1.1. Toowoomba flash flood

Toowoomba is the second biggest inland city in Australia located in a farming area in south-east Queensland. On January 10, 2011, after the wettest December in 68 years (Holmes, O'Sullivan & Cummins 2011) and 114mm in the first week of January, 70mm fell in one hour that triggered flash flooding along two creeks that met in the city's CBD. Two people died (Holmes, O'Sullivan & Cummins 2011), more than 300 vehicles were washed from car parks in the CBD downstream or damaged in situ and more than 50 businesses were damaged (Collins 2011).

According to the Australian Bureau of Statistics (ABS) (2013d) the population of Toowoomba in 2011 was 154,931, of which 48.9% were males, and 51.1% were females. Of the total Toowoomba population, 3.5% was indigenous. Table 4.1 shows details of the Toowoomba population (Australian Bureau of Statistics 2013d) and compares it with the participant profile. Some similarities exist except in the 65 years and over group.

**Table 4.1 Age profile of Toowoomba compared with the sample group**

| Age group | Number of people | Percentage of local population | Interviewees | Percentage of sample |
|---|---|---|---|---|
| **0-14 years** | 32,854 | 21.2% | 0 | 0 |
| **15-24 years** | 21,535 | 13.9% | 2 | 14.3% |
| **25-54 years** | 59,183 | 38.2% | 7 | 50% |
| **55-64 years** | 17,971 | 11.6% | 1 | 7.1% |
| **65 years and over** | 23,394 | 15.1% | 4 | 28.6% |

While most residents of the city held Australian citizenship, 15.6% were born overseas. The total labour force of the city numbered 72,256, with an unemployment rate of 4.8% (Australian Bureau of Statistics 2013d). Table 4.2 shows the employment profile of the Toowoomba community and of the interview sample. The large number of 'not in paid employment' participants reflects the number of retired people interviewed.

**Table 4.2 Occupation profile of Toowoomba compared with the sample group**

| Occupation | Number of people in the workforce | Percentage of local workforce | Interviewees | Percentage of sample |
|---|---|---|---|---|
| **Managers** | 14,254 | 9.2% | 2 | 14.3% |
| **Technicians and trades** | 19,366 | 12.5% | 0 | 0 |
| **Professionals** | 26,648 | 17.2% | 3 | 21.4% |
| **Clerical and administrative workers** | 26,028 | 16.8% | 0 | 0 |
| **Machinery operators/drivers** | 10,225 | 6.6% | 1 | 7.1% |
| **Labourers** | 22,619 | 14.6% | 0 | 0 |
| **Sales workers** | 12,394 | 8.0% | 1 | 7.1% |
| **Community and personal service workers** | 15,028 | 9.7% | 1 | 7.1% |
| **Not identified/not in paid employment** | 8,211 | 5.3% | 5 | 35.7% |
| **Unemployed** | 7,436 | 4.8% | 1 | 7.1% |

The largest group of workers (13.9%) was employed in the health care industry, followed by retail (10.9%) and education (9.9%). There were 55,182 households in the city, with an average size of 2.5 people (Australian Bureau of Statistics 2013d).

#### 4.3.1.2. St George slow flood

St George in South Western Queensland, is a farming community about 560km west of Brisbane located on the Balonne River. From March 1, 2010, heavy rain in the Darling River catchment for a number of days sent large amounts of water into the Maranoa and Balonne Rivers, threatening the St George township with its worst floods for 120 years (Binnie et al. 2010). When the flood peaked on March 6, 25 homes were inundated and 40 people evacuated to a centre at the showgrounds (Berry 2010).

According to ABS data collected during the 2006 Census (Australian Bureau of Statistics 2007a), the population of the Balonne Shire, of which St George was the

major centre, was 4,627, of which 51.2% were males and 14.9% were indigenous people. The following Table 4.3 details the Balonne Shire population (Australian Bureau of Statistics 2007a) and the interviewee profile has been added:

**Table 4.3 Age profile of St George compared with the sample group**

| Age group | Number of people | Percentage of local population | Interviewees | Percentage of sample |
|---|---|---|---|---|
| **0-4 years** | 425 | 9.2% | 0 | 0 |
| **5-14 years** | 757 | 16.4% | 0 | 0 |
| **15-24 years** | 520 | 11.2% | 1 | 7.7% |
| **25-54 years** | 1,984 | 42.9% | 8 | 61.5% |
| **55-64 years** | 468 | 10.1% | 2 | 15.4% |
| **65 years and over** | 472 | 10.2% | 2 | 15.4% |

While most residents of the district held Australian citizenship, 3.9% were born overseas. The total labour force of the district numbered 2,420, of which 65.8% were employed full time and 3.3% were unemployed. The profile of occupations shown in Table 4.4 again shows a skew toward managers and also community workers, which may have been a reflection of efforts to secure indigenous participants in the sample.

**Table 4.4 Occupation profile of St George compared with the sample group**

| Occupation | Number in workforce | % of local workforce | Interviewees | % of sample |
|---|---|---|---|---|
| **Managers** | 614 | 26.3% | 4 | 30.7% |
| **Labourers** | 442 | 18.9% | 0 | 0 |
| **Technicians and trades** | 260 | 11.1% | 0 | 0 |
| **Professionals** | 236 | 10.1% | 0 | 0 |
| **Clerical/administration** | 215 | 9.2% | 1 | 7.7% |
| **Machinery operators** | 213 | 9.1% | 0 | 0 |
| **Community and personal service workers** | 170 | 7.3% | 3 | 23.1% |
| **Sales workers** | 140 | 6% | 1 | 7.7% |
| **Not identified/not in paid employment** | | | 4 | 30.7% |

The largest group of workers (31.8%) was employed in the agriculture industry and 6.3% were involved in school education.

In St George, 1,150 households were defined as family households, while 357 households (21.3%) were lone person homes and 3% of households were described as a group household (Australian Bureau of Statistics 2007a).

### 4.3.1.3. Gerogery bushfire

Gerogery, in southern New South Wales, is a farming community about 30km north of Albury. On December 17, 2009, a fire started at Walla Walla rubbish tip about 14km north west of Gerogery and spread through a crown reserve to surrounding farmland, aided by strong winds of up to 107kmh (Mulcahy & MacDonald 2010, p. 1). Five houses were burnt down, four damaged, 17 outbuildings burnt down, six vehicles burnt, 1,005 sheep and 173 cattle killed, 248kms fencing lost and 471.3ha of unharvested crop destroyed (Mulcahy & MacDonald 2010, p. 1).

According to ABS data collected during the 2006 Census (Australian Bureau of Statistics 2007c), the population of Gerogery was 979, of which 51.6% were males, and 48.4% were females. Of the total Gerogery population, 1.4% was indigenous.

Tables 4.5 and 4.6 examine the profile of the wider Gerogery population (Australian Bureau of Statistics 2007c) and shows the differences and similarities with the profile of the participants. There were similarities with the Gerogery community in the number of people interviewed who were 55 or over, but there was a skew toward professional people. Table 4.5 provides the details.

**Table 4.5 Age profile of Gerogery compared with sample group**

| Age group | Number of people | Percentage of local population | Interviewees | Percentage of sample |
|---|---|---|---|---|
| **0-4 years** | 50 | 5.1% | 0 | 0 |
| **5-14 years** | 169 | 17.3% | 0 | 0 |
| **15-24 years** | 105 | 10.7% | 0 | 0 |
| **25-54 years** | 421 | 43.0% | 10 | 76.9% |
| **55-64 years** | 142 | 14.5% | 2 | 15.4% |
| **65 years and over** | 91 | 9.3% | 1 | 7.7% |

While most residents of the district held Australian citizenship, 4.9% were born overseas. The total labour force of the district numbered 543, of which 67.2% were employed full time and 2.4% were unemployed. The breakdown of occupations of employed people is shown in Table 4.6.

**Table 4.6 Occupation profile of Gerogery compared with the sample group**

| Occupation | Number in workforce | Percentage of local workforce | Interviewees | Percentage of sample |
|---|---|---|---|---|
| **Managers** | 131 | 24.7% | 1 | 7.7% |
| **Technicians and trades** | 81 | 15.3% | 2 | 15.4% |
| **Professionals** | 79 | 14.9% | 7 | 53.8% |
| **Clerical and administrative workers** | 67 | 12.6% | 2 | 15.4% |
| **Machinery operators/drivers** | 48 | 9.1% | 0 | 0 |
| **Labourers** | 44 | 8.3% | 0 | 0 |
| **Sales workers** | 36 | 6.8% | 0 | 0 |
| **Personal service workers** | 34 | 6.4% | 0 | 0 |
| **Not identified/not in paid employment** | | | 1 | 7.7% |

The largest group of workers from the Gerogery statistical area (18.7%) was employed in the agriculture industry and 8.5% were involved in school and tertiary education. Family households numbered 296, while 46 households (13.2%) were lone person homes. Six households (1.7%) were described as a group household (Australian Bureau of Statistics 2007c).

### 4.3.1.4. Airlie Beach cyclone

Airlie Beach in Northern Queensland is a tourist destination about 1100kms north of Brisbane (Claremont Books 1995), close to Proserpine. In the early hours of Sunday morning, March 21, 2010, Cyclone Ului, which had been building up in the Coral Sea for five days, crossed the coast at Airlie Beach.

According to ABS data collected during the 2006 Census (Australian Bureau of Statistics 2007b) the population of Airlie Beach was 2,751, of which 54.6% were males, 45.4% were females and 0.8% were indigenous people. Table 4.7 details the Airlie Beach population (Australian Bureau of Statistics 2007b) and the

interviewee profile has been added. It shows differences between the population and the sample in all but the 55-64 years age group.

**Table 4.7 Age profile of Airlie Beach compared with the sample group**

| Age group | Number of people | Percentage of local population | Interviewees | Percentage of sample |
|---|---|---|---|---|
| **0-4 years** | 155 | 5.6% | 0 | 0 |
| **5-14 years** | 258 | 13.5% | 0 | 0 |
| **15-24 years** | 419 | 13.6% | 0 | 0 |
| **25-54 years** | 1,463 | 42.2% | 8 | 72.7% |
| **55-64 years** | 305 | 11.1% | 1 | 9.1% |
| **65 years and over** | 153 | 5.6% | 2 | 18.2% |

While most residents of the district held Australian citizenship, 20.4% were born overseas. In addition, at the time of the census, there were 1,138 overseas visitors in the area. The total labour force of the district numbered 1,596, of which 66.6% were employed full time and 3.9% were unemployed. Table 4.8 shows the breakdown of occupations of employed people of the population and the sample. There is a skew away from clerical workers and labourers toward managers.

**Table 4.8 Occupation profile of Airlie Beach compared with sample group**

| Occupation | Number in workforce | % of local workforce | Interviewees | Percentage of sample |
|---|---|---|---|---|
| **Technicians and trade workers** | 309 | 20.2% | 1 | 9.1% |
| **Professionals** | 239 | 19.8% | 1 | 9.1% |
| **Managers** | 227 | 13.2% | 4 | 36.4% |
| **Community and personal service workers** | 167 | 10.9 | 1 | 9.1% |
| **Clerical/administration** | 167 | 10.9% | 0 | 0 |
| **Labourers** | 162 | 10.6% | 0 | 0 |
| **Sales workers** | 159 | 9.8% | 1 | 9.1% |
| **Machinery operators and drivers** | 80 | 5.2% | 1 | 9.1% |
| **Not identified/not in paid employment** | | | 2 | 18.2% |

The largest group of workers (13.2%) was employed in the accommodation industry and 5.8% were involved in cafes, restaurants and takeaway food services.

There were 627 households were defined as family households, while 236 households (13.4%) were lone person homes and 6.9% of households were described as a group household (Australian Bureau of Statistics 2007b).

#### 4.3.1.5. Summary of sample group profile

The profiles of participants were supplied to give information about who the participants were and a picture of the community they came from, rather than to show the representativeness of the sample.

The first interviews conducted were at St George, and half way through the interview booking process it was realised that the sample was under-represented in indigenous people (who make up a large group of the St George population), people under the age of 25, and those who were unemployed or in a low socio-

economic demographic. Special efforts were made to recruit participants from each of the three groups, and while additional indigenous participants were secured, young people and "battlers" were not interviewed. These two groups remained poorly represented in all of the locations, despite the researcher enlisting the help of youth development workers and staff from community not-for-profit agencies who worked with low income families. However, this was not so critical in during the interview stage, which was a discovery process. The information received was used to determine the practicality of the disaster information seeking model and also to provide a basis for a survey instrument – what questions to ask and what options to provide so that closed-ended questions could be asked for ease of analysis.

### *4.3.2. Discovering information seeking pathways*

This section will consider the results of the interview questions that dealt with how people received information and the process they used to ensure they had enough information during a disaster. It will compare the information seeking activities of interview participants with the disaster information seeking model, which is presented below in Figure 4.2.

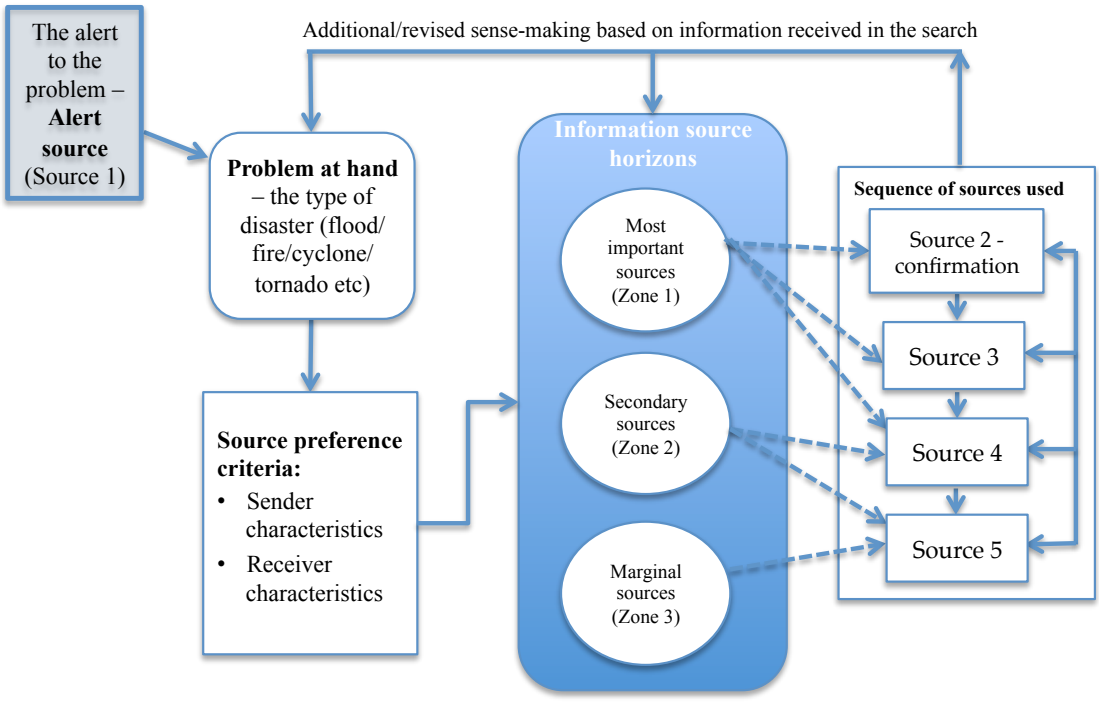



**Figure 4.2 The disaster information seeking model**

The interview analysis will consider the interview data in the context of disaster type and then by each of the model components.

#### 4.3.2.1. Flash flood

**The first alert and the problem at hand**

The flash flood pattern of information seeking was established in a very similar way to the bushfire, in that respondents got most of their information from other people, and the short timeframe of the event caught and held their attention for an intensive period in one day. However, it differed from the bushfire, because the bushfire respondents were familiar with the type of disaster, and many in the community had experienced a bushfire before. In the flash flood, it took more than just one confirmation source before many respondents could understand what had happened and then actively approach information seeking. This disbelief seemed to drive a cycle of sensemaking and information seeking over two to three days following the event. This section will show that many of the flash flood interviewees were passive receivers of information about the flood until after the confirmation source, whereas the previous three disaster types saw active information seeking starting once the first alert was received. This sensemaking process was evident throughout each of the 14 flash flood interviews

In the flash flood, the majority of interviewees (n=8) first heard about the flood from friends, family, neighbours or work colleagues via landline, mobile phone, email and social media, five learned by observing visual cues such as the rain and flooded streets, one learned about the event via ABC radio. Table 4.9 on the next page summarises alert and confirmation sources.

**Table 4.9 Alert and confirmation sources during the flash flood**

| | Other people email/SM | Other people phone | Other people f2f | Visuals | BOM website | Other website | Television | Alert totals |
|---|---|---|---|---|---|---|---|---|
| ***Alert source/form*** | *Confirmation source/form* | | | | | | | |
| ABC radio | | | | | | 1 | | 1 |
| Other people phone | 1 | | | 1 | 2 | | | 4 |
| Other people f2f | 1 | 1 | | | | | 1 | 3 |
| Other people email/SM | | | | | | 1 | | 1 |
| Environmental cues | | 2 | 1 | | | | 2 | 5 |
| **Confirm totals** | **2** | **3** | **1** | **1** | **2** | **2** | **3** | **14** |

In the cases where the first alert was environmental cues, such as heavy rain and flooding, the respondents did not seem to realise the seriousness of the situation, and the confirmation source was not actually sought by the respondents. Instead, it seemed that these respondents needed more than one confirmation message before they understood that this was a disaster and then engaged actively in information seeking. Two people were out when during the torrential rain (the first environmental cue), and it took them two hours to find a route home around streets closed by floodwater (the second environmental cue). After describing a number attempts to get the 3.6kms home, TF4 detailed a route of about 20km:

> *It was clear water, nothing in it, and cars were just quietly taking it in turns to go across there and then (we) got up James Street and started to down James and the traffic was backed up to Clifford Gardens, so I thought 'there's a reason for this'. So we were able to cross the median strip, went down and thought 'we'll go down to Alderley, then I thought, 'no…Alderley is in a dip, I'll go up South', went up South and then somehow cut across to West Street, got into West, went out to the Uni, went into Nelson Street, but at Baker and Nelson Street, the water was actually flooding garages there.*

It seemed that the task of driving home required such concentration that it did not occur to her or her husband to turn on the car radio, which they normally listen to when driving.

*Probably when we got home (we realised), it would have been from family ringing to say, 'are you alright?' and then we would have turned on the news in the afternoon. We knew it was being described as a tsunami around the world really. Meg phoned from Scotland, Rob phoned (from Canada) (TF4).*

TF7 described being at a large shopping centre and hearing the rain (environmental cue 1):

*(We knew it was serious) …when we got home and put the television on, that the rain was increasing, we had 60mls in an hour (environmental cue 2).*

She went out again and returned home to find her house flooding. At that point she stopped looking for information until that evening, while she attempted to rescue her belongings. A less-affected neighbour helped her and also kept her up to date until she watched the television news later in the day. Another respondent was flooded that day, but the torrential storm was unremarked – she was alerted by a neighbour to flooding through her house.

*Basically (I found out) when one of the girls screamed out 'shit!', because they had walked into their bedroom and it was an inch deep in water. It was just before the storm finished. Well, we all just got stuck in together and yelled at everybody else to let them know that there's water flowing through the place (TF1).*

This delay in comprehension also occurred for some of those who heard from other people about the storm that caused the flood. TF3 and TM6 were alerted to the coming storm by their son about 1200 kms away who had been watching the severe storm cell on the Bureau of Meteorology radar. So they got onto the BOM website themselves:

*And the cell was bright red in the middle- and that was (over) the whole of Toowoomba, then it was a great area of orange and dissipating out, and that was Yarraman to Warwick. Now while we were looking at that, it started to rain. Boy did it rain! (TF3).*

They stood watching the heavy rain for a few minutes, before they could see the water travelling through their backyard toward the house and their time from that moment was spent dealing with flood-water in the house. The time from the

start of the storm to the moment they felt they had beaten the floodwater was, they felt about 15-30 minutes (TM6).

The predominant alert source for the Toowoomba flash flood respondents was other people. A number of people were at work when other people asked them if they had seen the flood effects. Respondents then started to receive emails with pictures, which they said shocked them. The photos seemed to generate much more intensive information seeking than that experienced by those who had been alerted by environmental cues. TF2 reported that she learned about the flood via an email with some photos, coming from someone outside the city asking her if she knew where the pictures had been taken. She then sent and received emails, received notifications via her work intranet, checked The Chronicle newspaper and NineMSN news website, which had no information. Each of these tasks was repeated over a short period. Friends and relatives from outside Toowoomba started to telephone to check on her safety, and that was the pattern for the rest of her afternoon at work. On leaving work, she was in touch with her close family by phone and met up with family.

> *I went to Leonie's house and her retainer wall had fallen down, and the boys pulled apart the car (which had been inundated)…and then that's when Leonie and I sat down and just bawled because we were seeing it on television (deaths in Toowoomba and the Lockyer Valley close by) (TF2).*

In analysing the transcripts and plotting the information behaviour patterns, it was found that the alert source for the flash flood respondents was much less clear and separate from the confirmation sources and the rest of the source sequence than the other three disaster types. The confirmation sources and the patterns will be explored later in the chapter. The next section will clarify what influenced the way people sought information that day.

**Source preference criteria**

The literature review revealed a number of factors that affected the source preference criteria of individuals. These were:

- the features of the message such as source and forms, even form availability;
- the consistency, clarity, accuracy, certainty, and frequency of the message, plus the level of guidance presented in the message;

- the environment individuals were in at the time they sought information;
- social setting and social ties and networks within the community;
- the proximity to the disaster and the location of the individual;
- age, gender, education, and race/ethnicity;
- the resources individuals had access to; cognitive abilities of the individual and the process they use to make decisions;
- experience with previous disasters, especially of they same type they face; and
- locus of control – how much they take control of the situation themselves or rely on other people (or deities) to take control.

The flash flood interviews revealed a number of these affecting factors. The most prevalent was the cognitive ability of interviewees to process what was happening. The effects of the flood were evident to most of the interviewees in that the rain was so heavy and so many roads in the city were cut, that a 10 minute trip could take up to two hours. However, those who were not at work carried on with their day and did not seem to register anything out of the ordinary.

> *We were just driving to get somewhere, and we weren't even in a hurry to try and do it, we just moped along very steadily (TM2).*

This couple had been out to a doctor's appointment, took two hours and 20 kms to do a 3.6 km trip, and put the kettle on for a cup of tea when they got home despite being able to see from the kitchen window water flooding across the corner of their garden. It wasn't until they started getting calls from relatives in other countries who had seen Toowoomba's flooding on the news that they realised the event was out of the ordinary.

The flash flood claimed two lives in Toowoomba and second flash flood system at exactly the same time 50 kms away claimed a further 20 lives. The interviewees, all of whom lived in Toowoomba, which is on a mountain ridge, could not believe what was happening and many said that it took them several days to process the disaster – "You don't expect deaths up here from floods (TF1)":

> *We'd heard there had potentially been some deaths, so we were wondering what had happened here. I think for a lot of us, we were thinking, 'well, how and where did the water come from, and where did it*

*go?'…because I had actually not seen it, for me, I just couldn't really imagine it (TF8).*

One respondent described the effort to comprehend the reality of the flood:

*I can't…I had the oddest feeling…yes, I don't know how you put it into words – just empty and devastated – and the unreality of it all (TF3).*

The visual aspect emerged as an important factor in the way respondents were able to process and understand what had happened:

*I talked to more people at work and there were a lot of emails going around, lots of images sent around in emails. They were of water, cars up to their windows in water, people swimming and being swept away, Grand Central car park (a central shopping centre) covered in water…I was shocked, and then I started looking for info all afternoon, so I looked on news sites, I tried The Chronicle on the day, but they had nothing, I didn't really find anything, mostly images, but I did try other news sites as well (TM1).*

The disbelief also affected to those who had been notified by telephone.

*I rang a bloke in town and he said he had just been down to see the waters, everywhere, it's up to Betros's (a shop about 20 metres up the hill from the creek) and I said, 'you're on drugs…then because someone sent us an email of a photo of Grand Central, I was on the computer at the time…and I thought 'wow. I emailed that to someone we knew, and about ten minutes later they sent it through – their sister had taken it down Shore Drive and that's when we suddenly twigged that, 'hey, this is happening' (TM4).*

Television became in important source, probably because of the images that were screened, which provided context and evidence of what had happened:

*…we stayed glued to Channel 9 and watched their coverage for quite a few days, actually (TF8).*

The second most prevalent factor that emerged that affected respondents' information seeking was the availability of information, particularly local information. At first, from about 3 pm to 5 pm on the day of the flood, no information was available apart from the photographs that had been taken by

residents and emailed around, and it wasn't until the 5 pm or 6 pm television news came on that they were able to get any information at all. By the second day, no fresh news seemed to be coming through and respondents became frustrated at the way television and online media, in particular, "…just recycled the same stuff...(TM1)." This repeated information was cited as an obstacle to getting new information (TF2) and the lack of direct access to information from agencies was also a frustration until a few discovered the Queensland Police Service (QPS) Facebook page, which did not seem to gear up until news of the potential for Brisbane to flood came to light, a few days after the Toowoomba flood. The local council's website was not updated during the Toowoomba incident, which led to a search for other sources (TF2, TM5, TF8). By day three, respondents were frustrated when flooding that was approaching the state capital, Brisbane, filled the news and no local information was getting through.

> *It was hard to get local information. I would have said, bar that first day when we got some local information from WIN television, the focus sort of shifted down the range (to Brisbane) from then. It was hard to get local information and because we didn't have an AM radio in the house, I think we knew that ABC (radio) was probably the place to be listening, but we didn't have any capacity to get it in the house unless you went out into the car (TF8).*

Another factor that affected the choice of sources for some people was the accuracy of information. This, combined with information availability prompted a number of respondents to name identify the QPS Facebook page as their main source (TF2, TF8, TM5) - "….you could rely on it for true stuff." Another source considered accurate was ABC radio:

> *…because it's Toowoomba-based, it seems to be a live source of information and even if it's someone phoning up, who's on the spot saying I just saw such and such bridge get washed away, don't worry about taking that (route) (TM5).*

Road reports from the road agency were identified as inaccurate, although listening to the radio helped with this, as eyewitness accounts gave updates on certain roads. The other accuracy concern was rumours – such as refrigerated trucks and cold rooms being installed at Toowoomba Base Hospital to cope with the bodies, Wivenhoe Dam wall about to burst, and a child care centre at Murphy's Creek being washed away (TM4, TF6). The rumours and other

discovered inaccuracies made some respondents sceptical of information coming from other people (TM3, TM4, TF6).

Other message features that appeared to affect the selection of sources were clarity, consistency and frequency. The QPS Facebook page was updated regularly and that was what appealed to the respondents using this source; the clarity of messages (short, specific and presented in a uniform way) were also appealing (TF2). Television was valued because it provided a "constant feed" (TF1)

The location of people when they heard about or experienced the flood was an important factor in information seeking behaviour. Being in the car restricted respondents to radio and mobile phone (TM3, TF4, TM2); being in the path of flood waters and dealing with the flood restricted respondents to using other people as their source of information (TF7, TF3, TM6). One respondent was evacuated without her mobile phone charger, and this stopped her from communicating with people that she trusted as information sources (TF1). Being at work generally prevented respondents from listening to the radio or watching television (TM1, TF2).

Social ties was an important factor in securing information initially, but because friends family and neighbours seemed to be as much in the dark about what was happening as the respondents, other sources such as mainstream media and agency sources became more important than in other three disasters studied. A visit to a corner shop revealed a wealth of information for one respondent because she knew many of the people there:

> *There were just stacks of people at McKenzie Row as well, and that's how I found out what'd happened, with some of the deaths, that's how I found out that actually quite a few of our friends' houses had been inundated…so we found out the local information that way, so grocery buying (TF8).*

Checking on family and neighbours' welfare also revealed no new information for respondents, so while many of them continued to check on family and the neighbours, these other people were not a source of information. While other factors that could affect source preference criteria were not obvious from the interviews, they could have been present but not articulated by the respondents.

**Information source horizons and source sequences**

The confirmation stage of the Toowoomba flash flood respondents consisted of a range of information sources such as television, other people, going to have a look at the water, the Bureau of Meteorology website and other news and weather websites, and agency websites - but most people did not realize the impact of the event until they watched television that night. Unlike the other disasters, their main source changed after about 24 hours because of the repetition of information coming from the media, and in some cases, the discovery by respondents of official social media sites.

Once interviewees had learned of the flood, television was key to understanding what happened, and was the most important source of information for seven of the 14 respondents. This was despite the wait on the day of the flood until the news bulletins that evening to get some sort of picture of the disaster. Apart from television, most important sources were diverse – websites (n=2), ABC radio (n=3), and other people (n=2). The information pathway tended to be an alert by other people, followed by a mostly futile attempt to find information across a range of internet sources, then they turned to the television news that evening to find out what had happened. Television remained an important source, but once news reports became repetitive, agency social media and websites, as well as other non-weather websites, became key sources of information. These are summarised later in this chapter.

Toowoomba respondents used an average of 4.85 information sources each during their flood-focused search for information. Table 4.10 shows the most important sources for the flash flood participants (highlighted in the table), showing a clear preference for mainstream media - television became the main form of information for Toowoomba residents that day, followed by ABC radio.

**Table 4.10 Most important sources/forms during the flash flood**

| | Fire | Cyclone | Flood | Flash flood | Total |
|---|---|---|---|---|---|
| **Television** | 0 | 1 | 0 | **7** | 8 |
| **ABC radio** | 2 | 1 | 3 | **3** | 9 |
| **Other people** | 7 | 2 | 8 | **2** | 19 |
| **Agency website** | 0 | 0 | 0 | **1** | 1 |
| **Other website** | 0 | 1 | 0 | **1** | 2 |
| **Commercial radio** | 0 | 4 | 0 | **0** | 4 |
| **Emergency agency** | 0 | 0 | 1 | **0** | 1 |
| **Council or SES** | 0 | 0 | 1 | **0** | 1 |
| **Non-emergency agency** | 0 | 0 | 0 | **0** | 0 |
| **Visuals** | 4 | 0 | 0 | **0** | 4 |
| **BOM website** | 0 | 2 | 0 | **0** | 2 |
| **Agency social media** | 0 | 0 | 0 | **0** | 0 |
| **Newspaper** | 0 | 0 | 0 | **0** | 0 |
| **Social media/email others** | 0 | 0 | 0 | **0** | 0 |
| **Total count** | **13** | **11** | **13** | **14** | **51** |

### The sensemaking loop

This section of the disaster information seeking model was enacted by every Toowoomba respondent. The disbelief that a flood in Toowooomba could close access by two major highways, kill two people and wash away over 300 cars was evident, and information seeking seemed to be a reaction to the need to make sense of the disaster in this case. Unlike the bushfire, cyclone and slow flood interviews, where sensemaking was centred on what the disaster meant for each of the individuals interviewed, the sensemaking in Toowoomba was focused on what it meant for the community of Toowoomba and then the neighbouring communities affected at Grantham, Helidon and Murphy's Creek. In some cases, it consumed the respondents for the rest of the day after they realised that it was a disaster:

*About 2 pm I first heard, and then I started looking for info all afternoon...I went back onto news sites for the rest of the day (TM1).*

In this case, the sensemaking and the disbelief (cognitive abilities) were closely linked in the coding schema of each interview:

*I just remembered at the time WIN television showed a shot down to Grantham, flooding down there, and there were people sitting on this roof…and suddenly it dawned on me there was a sheet of tin off the roof. And I sort of thought, 'gee how desperate are you to punch that out', and suddenly I realised that was (people) down there and I was – it was ugly down there (TM4).*

From this point, this respondent flicked across television stations for several hours hoping to get more information, while his wife trawled the web. This behaviour continued over several days, although not as intense as on the day of the flood. This was the pattern for eight other interview respondents.

*…it (television) is the most constant way of finding out what's what. And I did flick from channel to channel because you get the different takes of – and, you know, you can work out the realities (TF1).*

*So I suppose I wasn't surprised about that, but when Kirsty told me that Miles had said that someone had been killed, I went, 'oh my god, that's a bit extreme', then we turned the television on (TF8).*

The sensemaking process was pronounced in the Toowoomba floods, and so the sensemaking loop will remain in the flash flood version of the disaster information seeking model

**What people were looking for**

The previous section on the sensemaking loop, as well as the explanation of the appearance of disturbed cognitive abilities, has shown that all of the Toowoomba respondents could not comprehend what had happened in their district. This became the primary focus of information seeking as time passed, punctuated by checking in with family, friends and neighbours as certain information came to light. The following day, road closure information became important for some of the respondents, although only two respondents searched for information on what to do. Surprisingly, given the severity of the flood, only two respondents reported that they checked the weather forecasts for news of future rain for the

area. Compared with the cyclone and slow flood respondents, the Toowoomba interviewees did not have a wide range of information needs. Table 4.11 provides numbers for each information need.

**Table 4.11 What people wanted to know in the flash flood**

| Information sought | Number |
|---|---|
| What happened | 14 |
| Whether family and friends were OK | 7 |
| Road closure information | 4 |
| What to do? | 2 |
| Weather/where will water go? | 2 |

#### 4.3.2.2. The effect of the flash flood interviews on the disaster information seeking model

The two main features of the flash flood interviews were the depth of information seeking, which seemed to be related to the level of disbelief and the need for sensemaking, and the compressed time in which everything happened. Again, time will be an important addition to the model. In the other three versions of the model, time was a factor of the progress of the disaster itself, but in the Toowoomba flash flood, it seemed to be about the time the respondents spent looking for information. Having the television on during the day, on constantly and switching from channel to channel all night were features of the time factor for this disaster.

Working through the model by component, the flash flood model has similarities in its sources to the bushfire version. However, the first alert came from few sources, which were other people, radio, television and environmental cues, and some differences occurred in source preference criteria. The factors affecting source preference criteria were source availability, message consistency, clarity, accuracy and frequency, social ties, proximity and location and cognitive abilities. Confirmation sources were other people, environmental cues, television and ABC radio, and the main sources were other people by phone, face-to-face, email and Facebook, environmental cues, agency social media, and the BOM website. Sources hardly used were newspaper, commercial radio and agency websites.

Except for the respondents who had water in their houses, there seemed to be no trigger for action, or indeed, any action at all by the Toowoomba respondents, except to look for more information. One family who had young baby and needed to increase their supply of baby formula was the only exception to this rule, and news that the highway from Brisbane was cut was the trigger in that case. While seeking information was the dominant activity for Toowoomba respondents, the time spent on the activity did not broaden the number of sources consulted. It seemed that respondents found informative sources and stuck with them, most of which provided images. Emails with photos attached, television coverage and Facebook messages were all sources that provided the need for visual confirmation. This could also be a reason for selecting or preferring a source, so should be included in the message characteristics. The presence of images does not seem to be covered in the list of message characteristics, so images might become a characteristic by itself. A representation of the model for flash flood information seeking is presented in Figure 4.3.

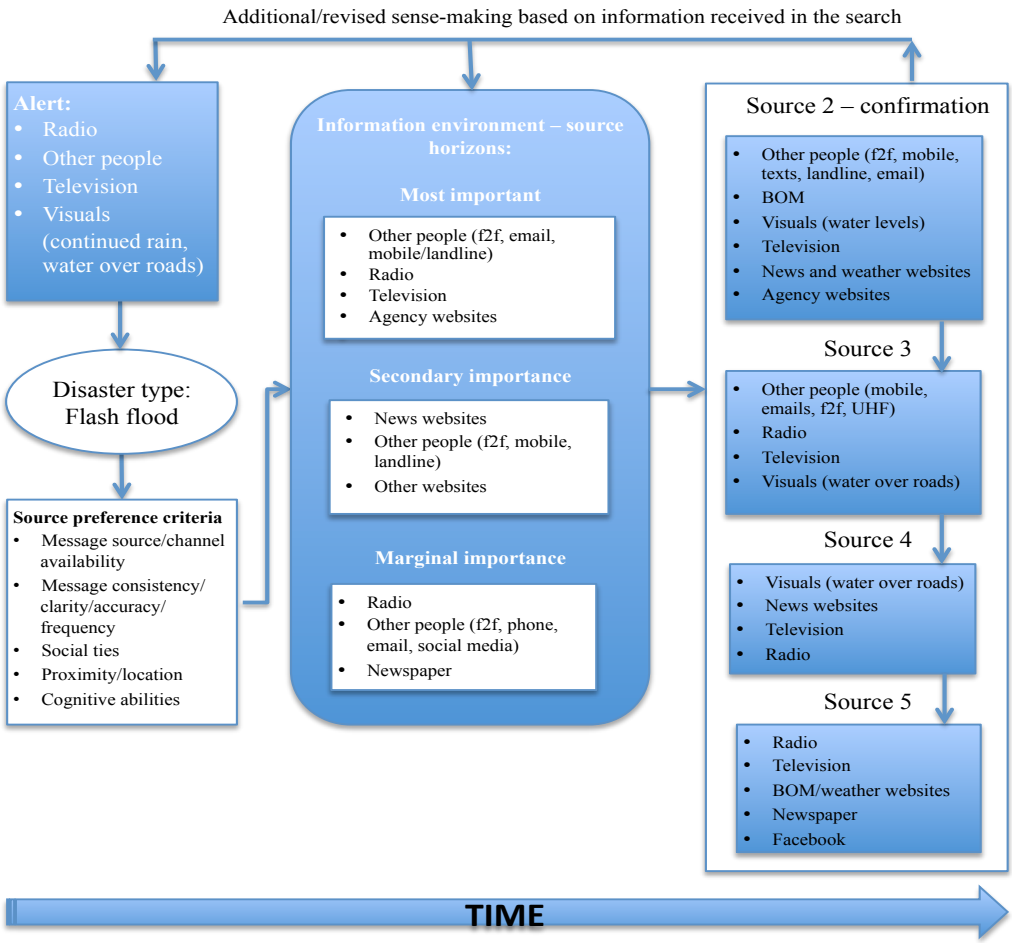



**Figure 4.3 A flash flood information seeking map developed from the interviews**

#### 4.3.2.3. Confirming the flash flood interview analysis

Again, the qualitative research analysis software, Leximancer, was used to test the results and identify gaps in the manual analysis. This step was considered necessary to ensure that the manual analysis did not overlook any insights presented by the interview data

**Preparation of the transcripts for analysis in Leximancer**

The Toowoomba flash flood transcripts required cleaning of the same words removed from the other three batches of interviews – 'probably', 'saying', 'everything', 'stuff', 'thinks', 'happened', and 'knew'. 'Hours', which was taken out of the St George batch, was left in the Toowoomba flash flood analysis, while 'cyclone' was removed. The first generated concept map also highlighted as a theme the word 'centre', which proved to be references to shopping centres. These came from recounts of where people were when they found out about the flood, shopping centre landmarks that were passed as they tried to find a way home through the water, and also references by some participants speculating about the triple 0 emergency call centre. For this reason, they were considered of low value to the analysis, and 'centre' was removed from the thesaurus.

The resulting hierarchy of themes (in Figure 4.4, below) produced interesting themes, with 'information' the most dominant, reflecting the participants' preoccupation with getting more information about the disaster. Information sources (other people and environmental cues) were the largest themes after information.

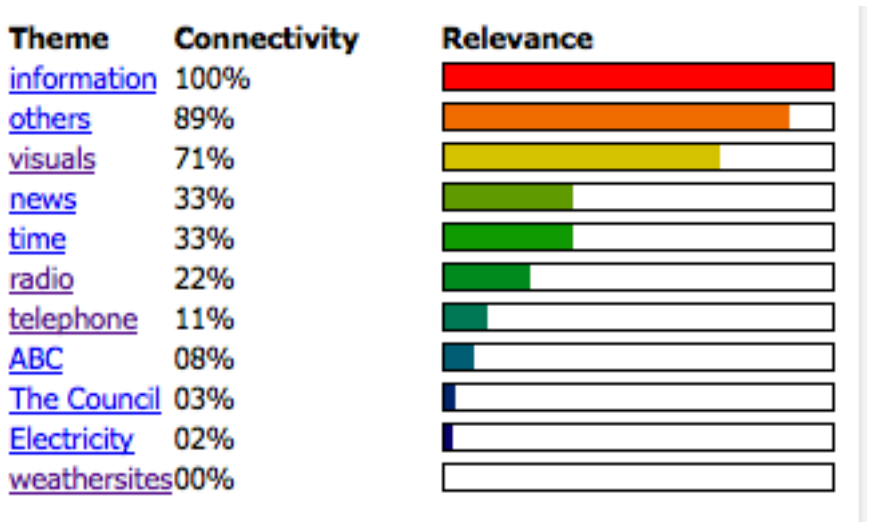


**Figure 4.4 Flash flood interviews concept hierarchy developed using Leximancer**

Of the four concept maps developed for this project, the Toowoomba flash flood map (Figure 4.5, below) was the only one in which a formal information source, in this case 'radio', was integrated into the central cluster, despite the initial analysis that showed that other people and television were the key sources of information during the flash flood.

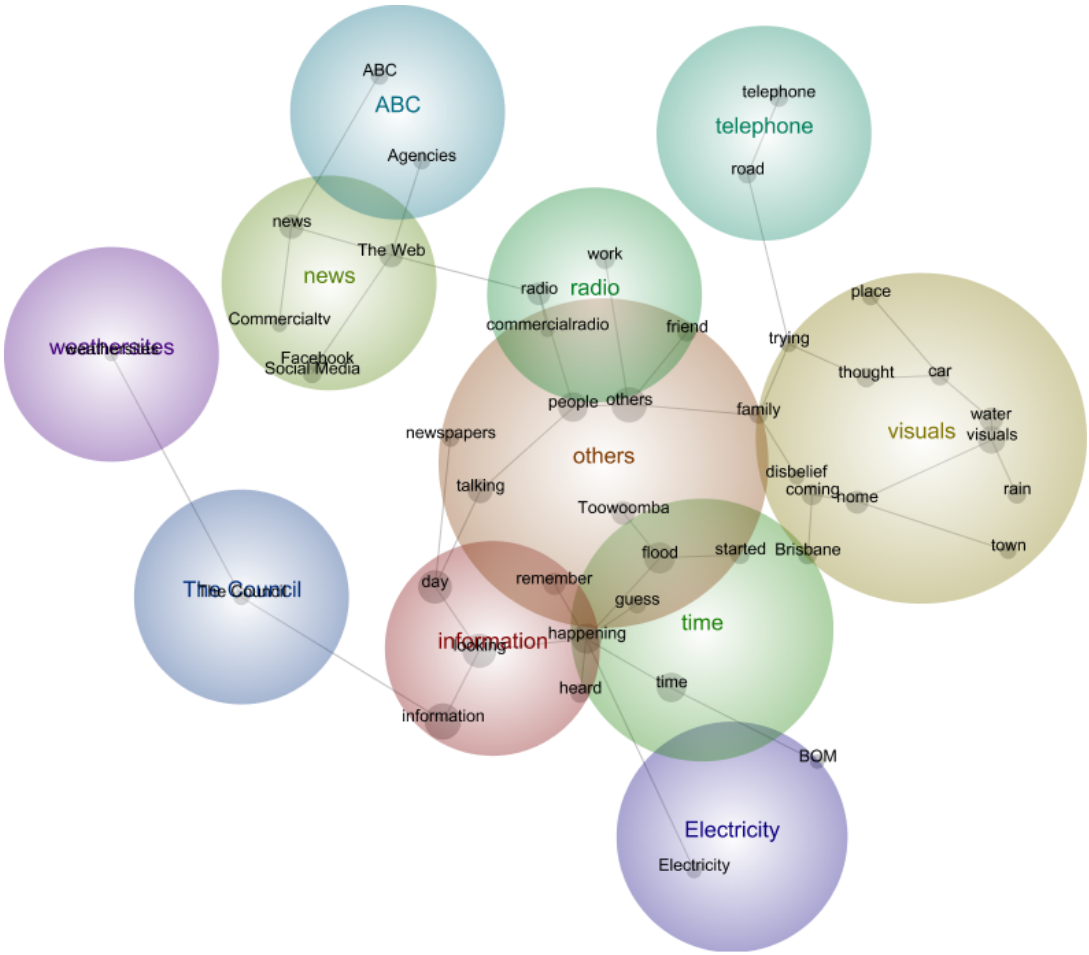



**Figure 4.5 Flash flood interviews concept map generated using Leximancer**

Closer inspection showed that this theme was smaller and less connected than the 'news' and 'ABC' theme, which contained television references and connections. 'Radio' scored 61 hits and connectivity of 22% while 'news' scored 91 hits and connectivity of 33%, and 'ABC' 38 hits and connectivity of 8%.

The other interesting aspect of this map was the prominence of the theme 'information', which confirmed the central theme of the manual analysis, which was the preoccupation the Toowoomba respondents had with securing information about what had happened, compared with the other three disasters.

In fact it was the most important and most connected theme of the map, made up mostly of connections to the concepts of 'information' and 'looking'.

As expected, 'others' was a major theme in the map, being the second most significant of the themes. This theme was closely linked to 'information', 'time' and 'radio', and also connected to 'visuals'. The initial analysis showed that most respondents in Toowoomba were alerted to the disaster by other people, so this map provided illustrative support for that conclusion, with 'information' flowing through 'others'.

As discovered in the manual analysis, photographs, film footage and seeing the effect of water in places they had never seen it before proved to be a powerful draw in the search for information by the Toowoomba respondents. 'Visuals' was the third most significant theme on the map and was strongly connected to and by the concepts 'water', 'visuals', 'rain', 'home', 'car' and 'family'. Unlike St George respondents, many of whom went to the river to check the water levels in the slow flood, the Toowoomba participants did not go out to have a look but saw images sent by email, on news websites or posted on Facebook. The size of this concept and the links between sources and their ability to provide images leads to the conclusion that could be an important influence on source selection. This was not a factor that was included in the original model, but should be included from this point.

In the manual analysis of the interviews from Toowoomba, the telephone emerged as an important tool for contact between interviewees and their friends and family. As a theme, 'telephone' sat on the periphery of the concept map, which may have been a reflection of its use as a tool of contact. It appeared connected through the concept 'trying' – a result of efforts to make contact as in: "…We did try ringing the council…" (TM1) and "…we would have tried to phone them…" (TF4).

Overall, the concept map for the Toowoomba flash flood reflected the initial analysis undertaken earlier in this section, where most people heard about the incident from other people, then searched for more information, settling on television to give them the best information. New sources were added as they were discovered by respondents, such as agency websites, news sites or social media, all of which appeared on the outer circle of the map. There seemed to be no concepts emerging from this map that were not discovered and explained in

the manual analysis, so no further changes will be made to the flash flood version of the disaster information seeking model.

**Flash flood interviews – a summary of their impact on this research**

The aims of the interviews and their analysis was to discover information seeking patterns and compare these against the original model, to determine if the disaster information seeking model was a reasonable framework for research in this field, and to present and to provide guidance in the development of a survey instrument for later use. The flash flood interviews revealed a number of different information seeking patterns, which depended on where people were when they learned of the flood, and also the media that they used in normal times. These information seeking patterns were explained well by the model, although influence of images, not previously considered a factor in source selection, was evident on the sources selected in this instance. The answers the flash flood respondents gave to the questions also provided a sound suite of answers for the closed ended questions that will be the technique used in the survey.

### 4.3.2.4. Slow flood

**The first alert and the problem at hand**

Like the alert sources for cyclone, alert sources for the slow flood were more varied than those reported by the bushfire interview respondents. The 13 St George respondents first learned about the flood from a wide range of sources, including environmental cues (rising floodwater, constant rain, n=4), ABC radio (n=2), other people (n=2), emergency agencies (n=2), television (n=1) and the Bureau of Meteorology or other weather website (n=1). All of the respondents indicated that the widespread rain had laid the groundwork for a flood alert, so that when it came, it seemed to be no surprise.

> *I remember quite clearly because I came back from holidays on the Sunday, the rain started Sunday night and by Wednesday I didn't need to talk to anyone…I knew after getting 100 millimetres here every day and I knew from my own family and various rainfall - was probably through the ABC and on the web – over such a huge area, I knew by Wednesday we were in for a belting (SGM4).*

*Geez, because Roma was first …so once Roma flooded, that's when we started thinking there is something going on here, like those bog falls…And we woke up, it must have been Thursday, we woke up and listened to the radio and the radio was saying that this was going to be big…(SGF6).*

Those who learned from other people about the flood did so from partners, community colleagues, neighbours and relatives. Table 4.12 details the alert and confirmation sources for the St George slow flood interview respondents.

**Table 4.12 Alert and confirmation sources for slow flood**

| | Other people | Environ-mental cues | Emergency agency | Alert totals |
|---|---|---|---|---|
| ***Alert source/form*** | ***Confirmation source/form*** | | | |
| ABC radio | 1 | | 1 | **2** |
| Other people | | 2 | | **2** |
| Emergency agency | | 2 | | **2** |
| Environment cues | 4 | | | **4** |
| BOM or other weather website | 1 | | | **1** |
| Television | 1 | | | **1** |
| Commercial radio | | | 1 | **1** |
| **Confirm totals** | **7** | **4** | **2** | **13** |

**Source preference criteria**

The filtering of sources and forms phase on the St George slow flood showed that a wide range of factors affected source preference criteria of respondents. Those evident from the transcript analysis were the source or form carrying the message (availability, accessibility, trust in the source); message consistency, accuracy, certainty, guidance and frequency; environmental cues; social ties; proximity to the flooding; resources available; cognitive abilities, particularly the decision to act on warnings; previous flood experience; and locus of control, which in St George was represented at extreme ends of the scale.

Availability of radio and internet, as well as the respondents' level of trust in the source or form, were remarked as obstacles to getting the information they needed for many of the respondents in St George. One respondent had trouble accessing the internet and regularly visited his workplace to do this. He also had irregular access to radio, because he was not in his house or car much, but working with neighbours and friends to prepare for the flood (SGM1). In addition, some Bureau of Meteorology river gauges that live-streamed information to the BOM website appeared not to be working, and this created consternation for a number of the respondents who relied on this information to interpret how the flood would affect them (SGM1, SGM3, SGM4). Other respondents did not access the web regularly because it was "a pain and clunky" (SGF6 ) or a reasonable service but affected by water or lack of power (SGF7, SGM4). One group of respondents, who lived on a secondary river to the one flooding St George, were frustrated by the lack of information and forecasts on flood heights for their river system (SGF9, SGM3, SGF6). Most of the area was also out of mobile phone coverage.

> *I mean, if I had a mobile service, I probably would have used that a lot too, because there are a lot of friends down the river, you know, just 'how are you doing up there?' or 'how are you doing down there?' (SGF9).*

Landlines were also cut off because of the floodwater inundating underground lines (SGF4). Summing up access problems was (SGF8):

> *I wasn't able to turn on the radio, so when the power went out, nobody had access to any power. So they couldn't hear reports on the radio, and you couldn't get on the internet. You couldn't do anything unless you called somebody, and if you didn't have numbers you were sort of blind for a while.*

Trust in the source and that source's credibility (usually indicated by a position on the local disaster management group, the LDMG) was also key, and seemed to parallel the level of social interconnections in the community and social ties of the individual. One respondent was a neighbor of the mayor, who led the local council response, and two other respondents relied on their boss for information, who was also on the committee. A fourth respondent was a committee member. All used their connections to the LDMG to look for new information, confirm information they had already heard and to determine what was rumour.

Message consistency and accuracy also guided the choice of sources for many respondents.

> *It would also have been really nice not to have these fluctuating levels, we kept hearing different levels and the information did not seem to be consistent, different media had different levels (AGM1).*

> *They're a bit confusing, because you've got at Flinton someone reporting the levels there that's the same, one's 2.6m and one's 4.3m, that one has taken off the bed of the river and that one is taken off the crossing (SGM3).*

> *We knew there was a lot of error there. We also knew that the main gauging station that was up the river at Weribone wasn't working above a certain level, so we knew that some water hydrologists were guessing as much as we were (SGM4).*

In this case, the problem was countered by calling people upstream on the river and cross referencing the river gauge information with visual references to water heights measured against a feature on that neighbour's property. For those not using the gauges as a key source of information, the BOM website was found to be very reliable (SGM2, SGF5). Radio reports seemed to be behind progress of the flood, so there was a pattern amongst interviewees to listen to the radio, but not expect any new information, which they secured from other sources such as neighbours or the council email bulletin. However, one respondent found the radio reports up to date:

> *…and they were doing one every 15 minutes or something, pretty regular, every 15 to 30 minutes, because they actually had a bloke in St George, Cunnamulla and Roma and very much what they were saying they were getting from the locals (SGF1).*

Respondents became more critical of some sources as they progressed through the disaster. Talking about other people as a key source, one respondent questioned whether some gave the right information.

> *I think the strengths (of other people as a source) would probably be that you got the information quite quickly, and one of the weaknesses was whether it was the right information. It's amazing how quickly people know things, but you sort of said 'where did you hear that from?', it was all a bit hazy (SGF2).*

> *There could have been people that told me things and I just disregarded them, whereas the people that I relied on I think were giving me all the information as accurate as possible that I wanted (SGM2).*

Photos were also a way of determining the accuracy of information, and these were passed on by social media or face-to-face. Email was also a welcome source of information for those with no telephone, and the consistency of the messages coming from friends at the same time of day was appreciated (SGF4) even if there was no new information contained in the message.

Message frequency was important to the slow flood respondents, while message certainty and the level of guidance in the message were mentioned occasionally. The availability of the river gauge information for frequent checking seemed to be a feature of the selection of this source, even though the accuracy needed some interpretation. Similarly for those using visual checks on the river – up to hourly for some people (SGF6). The personal contacts on the LDMG were important because they provided certain information and some guidance with no dilution of the message (SGM3, SGF7, SGF8) and council email updates received by one respondent were important because of their regularity and prediction information (SGF6). Regular updates were also appreciated on radio (SGF1).

The proximity and environment/situation filters in the source preference criteria were evident in these interviews. The situation that the respondents found themselves in contributed to their selection of sources of information – for instance, living close to the river (also proximity) allowed most respondents to check water levels as one of their key sources. Rainfall prompted searches for information, usually on weather websites. One respondent worked at an old people's home and her information seeking was coloured by the potential for evacuation of her residents – so the LDMG meetings became her main source of information because the committee was able to give her updates specific to her workplace. Two farmers interviewed used the river gauge system and the BOM website as their key source, as did a respondent who worked for a farm machinery and supplies company. This reflected their occupations and their usual reliance on these sources.

Social ties were prevalent in this community, possibly because of its size (about 2,000 people), history, which was referred to often by the interviewees in relation

to flooding, and isolation (five hours' drive to the next big town). Every respondent had some social or work network that became a valuable information source, most had more than one, and use of these networks was evident in the importance of other people as sources of information.

> *I was there supervising (at the evacuation centre) and helping people and doing all that sort of thing and settling them in and keeping the kids entertained and showing them where the food was. And then I was over at the call centre as well, taking calls…and referring them on and giving them information on what was going on…and I also worked with Red Cross as well. So we shared information as well, because they had reps up there and I had reps there and it was good that way (SGF8).*

> *So Peter is my uncle and he works on the council, so he knows lots of stuff about that as well (SGF7).*

> *I got that information from, not directly from people up there, but from other people that knew them (SGM3).*

> *…we have got a bit of background knowledge with family working in the council and a next-door-neighbour who works with another local government, you sort of had a bit of background knowledge and you weren't left out in the cold…(SGF3).*

> *I had a mate who was doing a lot of flood readings and he was doing correlations with the flood heights with his GPS and working – he helped us and a few others work out and try and correlate where the predicted flood heights would come to. You know Glen next door, he's in close contact too with the relevant authorities so he had a pretty firm idea of what was happening, so neighbours are pretty important in flood times. It all linked in pretty well together, just sharing information and helping each other out (SGM4).*

> *Like, they're neighbours, the Wheelers next door, he came around a couple of times. I usually get calls from down the river, to find out what's happening up our end (SGF9).*

The three filters that seemed to be closely linked in bushfire – resources, experience and locus of control – were also evident here. The sections of interview that were coded for locus of control also appeared, without exception,

very close to references of resources, and these were usually near illustrations of experience. This pairing of the first two were not surprising, because the existence of resources such as generators and pumps indicates a willingness to prepare, which in the literature indicated some degree of internal locus of control and self efficacy. If personal experience did not appear in the cluster, interview respondents recounted the experience of others as a source of information close to the other two factors.

> *Yeah, we had a generator though, so we just, so to keep our fridge and freezer going, we just…kept plugging the freezer into that and then you know, for a few hours and then we'd plug the fridge back in and then we were all wanting to charge our phones as well, and Dad was like, 'don't you worry about your bloody phones (laughter)' (SGM7).*

> *They (the LDMG committee members) often referred to the previous floods and it was interesting that there was a gentleman at the meeting who was born here and everyone would talk and they'd say to him, 'do you think that's right and who's going to be affected', because I guess knowing who's out there and what properties were out there, they kind of used him as a local course of information (SGF2).*

> *Just from having lived here, being born and bred on the Maranoa, so I knew pretty well just the amount of rain over that size of the area, that we were really going to cop it. So from about Wednesday, I was getting ready for a really big flood…we had lots of warning, which was great, so we were able to do it (move all the farm and personal gear) stage by stage, day by day, you know, do the home first, then the shed, then we attacked the cellar and everything (SGM4).*

> *By Tuesday and Wednesday I'd lifted all the stuff up off the ground and did all the normal things, get mattresses up onto desks and cleared out the backroom and put a lot of stuff in the back shed. I didn't bank on the power going out until well after the peak. That (having no power) went until well after the flood, maybe a week and I used then generator from next door because I had no power and I was back in there cleaning up (SGM1).*

This fellow had also done a great deal of flood preparation using levels and GPS systems, and did the same for friends and neighbours in the lead up to the flood:

*I knew when I bought the house (about the possibility of flooding, so) I shot some levels from the gauge here (points to gauge down the river) back to the house to work out what was reported on the gauge and knew exactly what the levels would be on the house (SGM1).*

The remaining filter that emerged from the interviews was the cognitive ability of the respondents. On the whole, they used history to interpret the forecast flood levels and accepted that the flood could well affect them, taking action where they could. The only evidence of respondents dismissing evacuation warnings was when police visited two of them and insisted the evacuations take place immediately, even though the respondents had calculated that they had more time, up to two days more. There was no evidence of any cognitive impairment caused by stress, as there was in the bushfire interviews. There were a few moments, however, where disbelief delayed action for some respondents:

*It was sort of like, no, there's no way we can have that much water in a limited time. We haven't had this much rain forever, so it's not going to flood (SGF8).*

*It was actually real, it wasn't just a bad dream or a movie, you know you wake up and sometimes you think it was a movie, it was that sort of experience. Way out of left field. So the anxiety levels were pretty high prior to the floods (SGM4).*

And other instances where people with high levels of resources, experience and locus of control had to choose between information sources:

*And the police were, I might say, entirely unhelpful. They were racing around predicting 17 m floods and I've got to ask where they were getting their information...it was only 10 m at that stage, but they were trying to get people out… We already knew that our information's a lot better than the police. As I said, we were monitoring it every day, so we knew we had a lot of various sources of information and we were fairly well briefed on the levels as they rose each day...and you just sort of weigh up all the bits and pieces and chuck out the less reliable stuff (SGM4).*

In addition, there seemed to be a comfort factor in talking to more experienced people about what to expect of the flood and what to do:

*…I guess because I hadn't been in the area long or dealt with anything similar, there were other opinions and other inputs that were asking the*

*questions that I thought, 'yeah, okay, that's important', whereas I hadn't thought of it (SGF2).*

*Well, Dad knew that, so he'd say, 'oh we'll be right. The whole town'll go under before us (SGF7).*

Overall, the filters affecting source preference criteria were:

- the source or form carrying the message (availability, accessibility, trust in the source);
- message consistency, accuracy, certainty, guidance and frequency;
- environment and/or situation;
- social ties;
- proximity to the flooding;
- resources available;
- cognitive abilities, particularly the decision to act on warnings;
- previous flood experience; and
- locus of control.

Those that were not obvious in the transcript analysis were:

- message clarity;
- age;
- gender;
- education; and
- race/ethnicity.

**Information source horizons and source sequences**

Other people were one of the main sources of confirmatory information for the slow flood respondents (n=7), and also a most important source (n=5) – those respondents seeking information from other people talked to residents who were experienced in previous floods, had a position on the local disaster management group (LDMG) or who had special expertise to help them work out what the flood heights meant for their own house. Other confirmation sources were environmental cues (n=4) and agencies (n=2). The use of other people was directly linked to the need to know what a 13.4m peak of the Balonne River would mean for the homes and properties of individuals and there were several mentions of how useful the flood map published by Balonne Shire Council was

to respondents. This effectiveness of visual confirmation theme emerged in all four disasters.

As with the bushfire, environmental cues (going to check the river levels) were an important confirmation tool during slow moving flood. ABC local radio was another main source, although five of those who used radio commented that it was either behind the times or concentrating on the Balonne River with no news of another river very close by, the Moonie. For those isolated from St George but still on the Balonne River, the ABC was an important source of information, particularly for those people without electricity.

The information seeking pattern that emerged in St George was generally to hear about the approaching flood from media or other people and then to consult other people considered to be more experienced or knowledgeable, including agency or local council contacts, or to check river flood heights via the BOM website gauges or going to look at the river. Television news and weather and regular visits to the river emerged as a backup source that was consulted regularly in the information seeking process. This is demonstrated in Table 4.20, where 'other people' were the alert source in four cases and confirmation source for eight of the interviewees.

St George respondents used an average of 5.38 sources each. Like the bushfires, other people were the most important source of information along with the BOM website, followed by the government broadcaster, ABC radio. The most important sources for the slow flood participants are highlighted in Table 4.13 over the page, with other people again significant.

**Table 4.13 Alert and confirm sources compared with other disasters**

| | Fire | Cyclone | Flood | Flash flood | Total |
|---|---|---|---|---|---|
| **Other people** | 7 | 2 | **5** | 2 | 19 |
| **ABC radio** | 2 | 1 | **3** | 3 | 9 |
| **BOM website** | 0 | 2 | **3** | 0 | 2 |
| **Emergency agency** | 0 | 0 | **1** | 0 | 1 |
| **Council or SES** | 0 | 0 | **1** | 0 | 1 |
| **Commercial radio** | 0 | 4 | **0** | 0 | 4 |
| **Non-emergency agency** | 0 | 0 | **0** | 0 | 0 |
| **Visuals** | 4 | 0 | **0** | 0 | 4 |
| **Agency website** | 0 | 0 | **0** | 1 | 1 |
| **Other website** | 0 | 1 | **0** | 1 | 2 |
| **Agency social media** | 0 | 0 | **0** | 0 | 0 |
| **Television** | 0 | 1 | **0** | 7 | 8 |
| **Newspaper** | 0 | 0 | **0** | 0 | 0 |
| **Social media/email others** | 0 | 0 | **0** | 0 | 0 |
| **Total count** | **13** | **11** | **13** | **14** | **51** |

### The sensemaking loop

As with the cyclone and bushfire interviews, the sensemaking process was evident in most of the interviews, as every person either translated the flood height information into what it meant for their home and workplace, or sought someone to do this for them, in an ongoing process as the flood progressed. Sensemaking was usually linked to either interpretation of the river gauge information published on the BOM website, or going to look at river levels, or both. It was also linked to flood heights published by the LDMG.

> *I compared it a lot and to what I thought would happen. I watched it very keenly because I was keen to know how accurate the predictions were going to be and compare it with what I have witnessed in the past (SGM2).*

*For me, it was important to go for a drive around because like, I was stuck up at the evacuation centre for hours and like, I could only see the water coming past…because I actually live up that end of town (SGF8).*

In some cases, people were too busy to look for information and so sensemaking also stopped until the disaster was almost on their doorstep.

*I was preoccupied with, I've got work to do, so the Roma stuff (flooding at Roma, which can act as a warning for the St George district) was happening, we knew that something was going to happen in our catchment just because of rain, but then it probably wasn't until about, probably about two days before it really peaked that we understood, 'shit, this is big' (SGF6).*

Others took action to make sense of what they were hearing.

*We actually did that ourselves because we heard on the grapevine that it was going to reach a certain height, so we got some gear and did the height levels…we did it ourselves (SGF3).*

*So when it (predictions of the peak) got to 14m, I had a mate who was doing a lot of flood readings and he was doing correlations with the flood heights with his GPS…so we worked out that 12.5m would have been shed height, or 13m, based on previous readings, a whole lot of stuff (SGM4).*

For one respondent new to the district and with no flood experience, the sensemaking process did not provide the knowledge that she needed to make better preparations, and the flood, when it finally arrived, caught her by surprise even though she had received regular, trustworthy information over the week leading up to it. Other sensemaking of the magnitude of the disaster was undertaken by respondents triggered by photos sent by email or on Facebook, or information given to people about flood heights and gauges. Four respondents used a phrase like "…that's when I realised…", "…that's when we started thinking…", "…oh shit, we are in trouble…", "…alarm bells hit then…", and all of them looked for more information immediately the realisation hit. This circular process is well accounted for in the disaster information seeking model, and should remain in any version that is attempting to illustrate a slow flood.

**What people were looking for**

Like the cyclone and bushfire interviewees, the slow flood respondents wanted to know the timing and magnitude of the disaster, particularly what height the flood would peak and when that would happen. To help them interpret this, they also sought information from people who were experienced in a flood about where water levels reached in the 1990 and 1965 floods, in order to give them a point of reference for their own property. Wanting news on the welfare of others was not so strong in the slow flood interviews, which may be because the flood was not perceived to be a danger – although this would be an issue to explore in future qualitative research. The full list of what people wanted to know is below in Table 4.14.

**Table 4.14 What people wanted to know in a slow flood**

| Information sought | Number |
|---|---|
| How will the flood affect own property | 13 |
| Flood peak information | 12 |
| Learn more about previous flood experience of others | 8 |
| How others fared | 4 |
| What agencies were doing | 3 |
| Evacuation information | 2 |
| What to do to prepare | 2 |
| How the workplace would fare | 2 |
| Whether a rumour was true/false | 2 |
| Road closures and routes for travel | 1 |
| When electricity would be back on | 1 |

### 4.3.2.5. The effect of the slow flood interviews on the disaster information seeking model

The slow flood interviews provided rich data about how people look for information in a slow flood that could be applied directly to the disaster information seeking model developed in Chapter 2.

A range of alert sources were identified (radio, other people, environmental cues, weather websites, emergency agencies and television), and along with the confirmation sources, a sequence of sources was plotted. The confirmation sources were other people (usually face-to-face or by landline), weather websites, radio, personal contacts in agencies, environmental cues and agency personnel face-to-face. Most important sources, secondary sources and marginal sources were plotted for each interview respondent, and a number of the factors that affected their source preferences were identified. These were message characteristics relating to reliability and credibility, respondents' environment, social ties within the community, the proximity of the respondent to the flooded areas, resources, cognitive abilities, previous flood experience and their locus of control and self efficacy. Sensemaking was evident from the interview data, and this supports the sensemaking loop contained in the model.

As in the bushfire and cyclone interviews, the time factor emerged as a major marker and trigger for interviewees, so this will also be added to the model. Respondents measured the depth of their activity against a calendar the length of the flooding - "…two days out…", "…by Wednesday…", "It was a week before…". The pressure of time also contributed to triggers for action during the flood, either information seeking or preparation activity. The details added to the model creates a map that looks very similar to the original model reported in Chapter 2, with just the time component differing. Unlike the cyclone and bushfire interviews, the pattern of information seeking, once established by each individual, changed very little, even as the peak of the flood got closer. A representation of slow flood information behaviour is presented in the model in Figure 4.6.

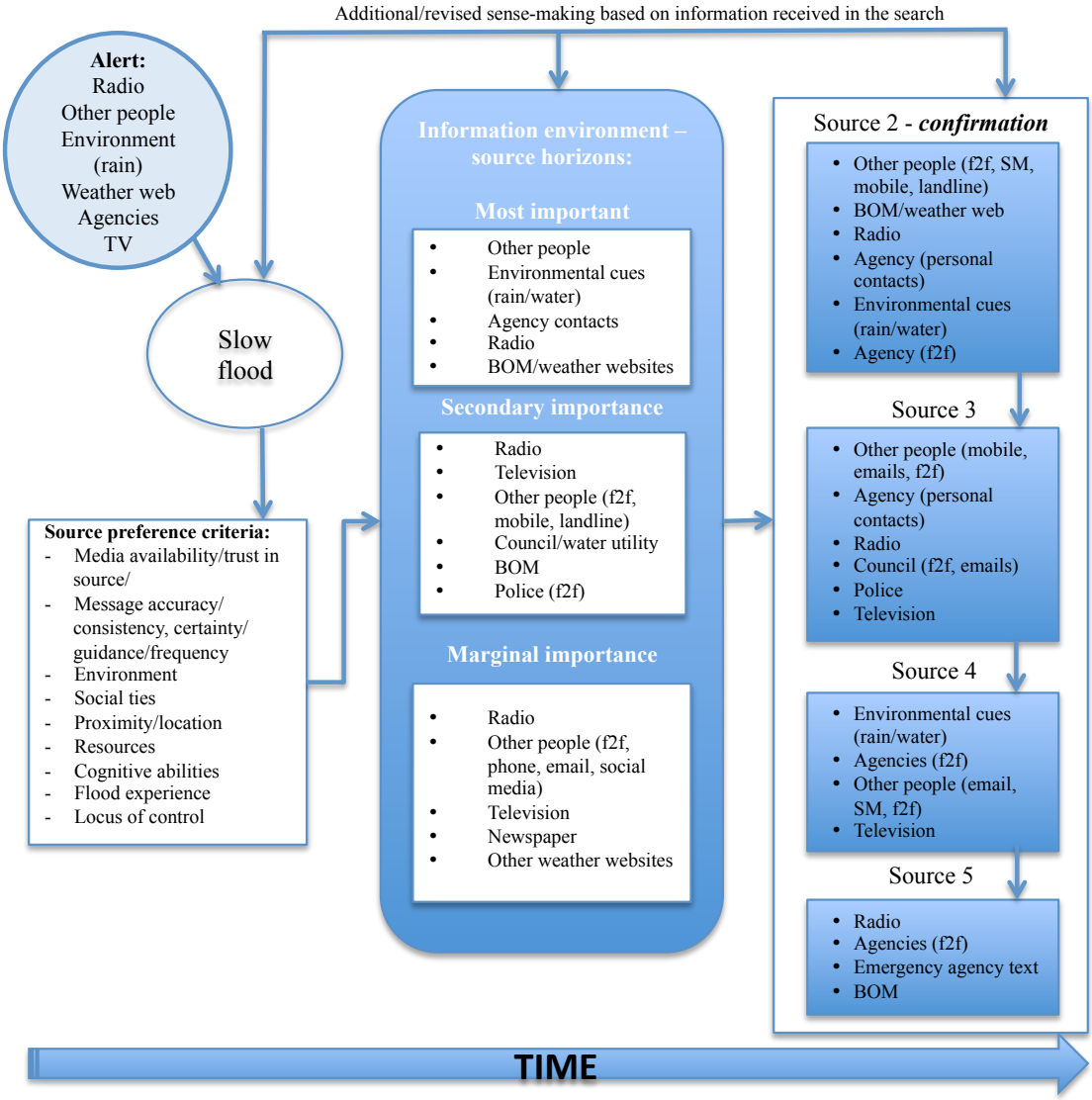



**Figure 4.6** **The St George slow flood information seeking map developed from the interviews**

### 4.3.2.6. Confirming the slow flood interview analysis

As with the previous two disaster types, the qualitative research analysis software program, Leximancer, was used to test the results and identify gaps in the manual analysis. This step was necessary to ensure that no insights into information seeking in a slow flood had been overlooked.

**Preparation of the transcripts for analysis in Leximancer**

The St George slow flood data was then entered into Leximancer. The data was checked in the same way as the previous two batches of interviews for words of low semantic value, and these were again discovered to be 'probably', 'stuff', 'thinks', 'happened', and 'knew'. These were removed as concepts. The other words that were cleaned from the cyclone and bushfire data such as 'saying' and 'heard' did not occur with enough regularity to form a concept, so no action was taken to clean the data of these words. However, one that did show up on the initial map was the concept 'hours', which could not be merged with the concept 'time' because of the different usages of the two words. Most of the usages of the word 'hours' by the St George interviewees related to driving distance of places, the length of time it took for respondents to look for information each day and the length of time power was out, so it was removed from the thesaurus. In addition, the user-defined concept of 'cyclone', which contained the words 'track' and 'strength' appeared on the map within the 'flood' theme. This was a result of using a user-defined concept template across the four sets of interviews before tailoring the files to each circumstance. The concept 'cyclone' was removed from the user-defined list for the St George interviews.

The following concepts (Figure 4.7) and their connections to the other concepts emerged, with the flood dominating conversation. This predominance of the relevant disaster type might seem obvious, but it was not the case in the bushfire and cyclone. Information-related themes and the deadline of the flood were a little way behind.

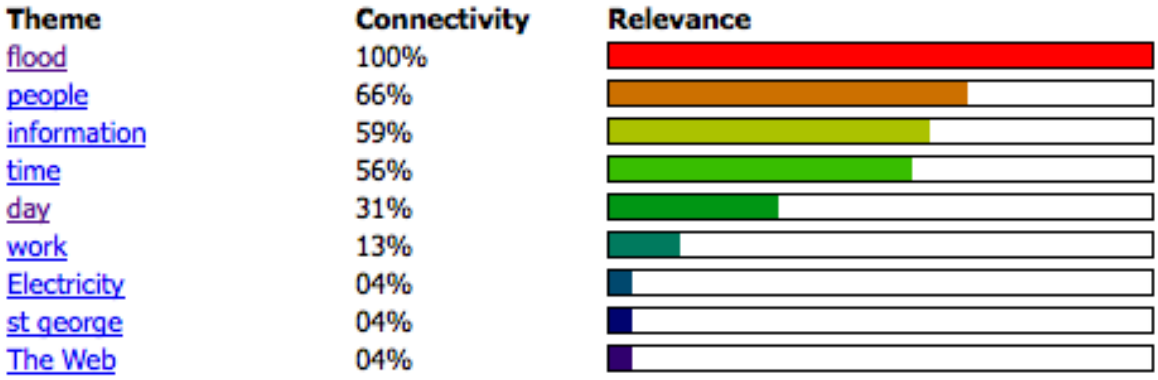



**Figure 4.7 Slow flood interviews concept hierarchy generated using Leximancer**

This concept map (see Figure 4.8, below) was the most tightly clustered of all of the maps generated for this study, with large overlap between the concepts, particularly the two leading concepts, 'flood' (308 connections) and 'people' (169 connections), and the fourth largest concept, 'time' (93 connections) featuring relatively few connections.

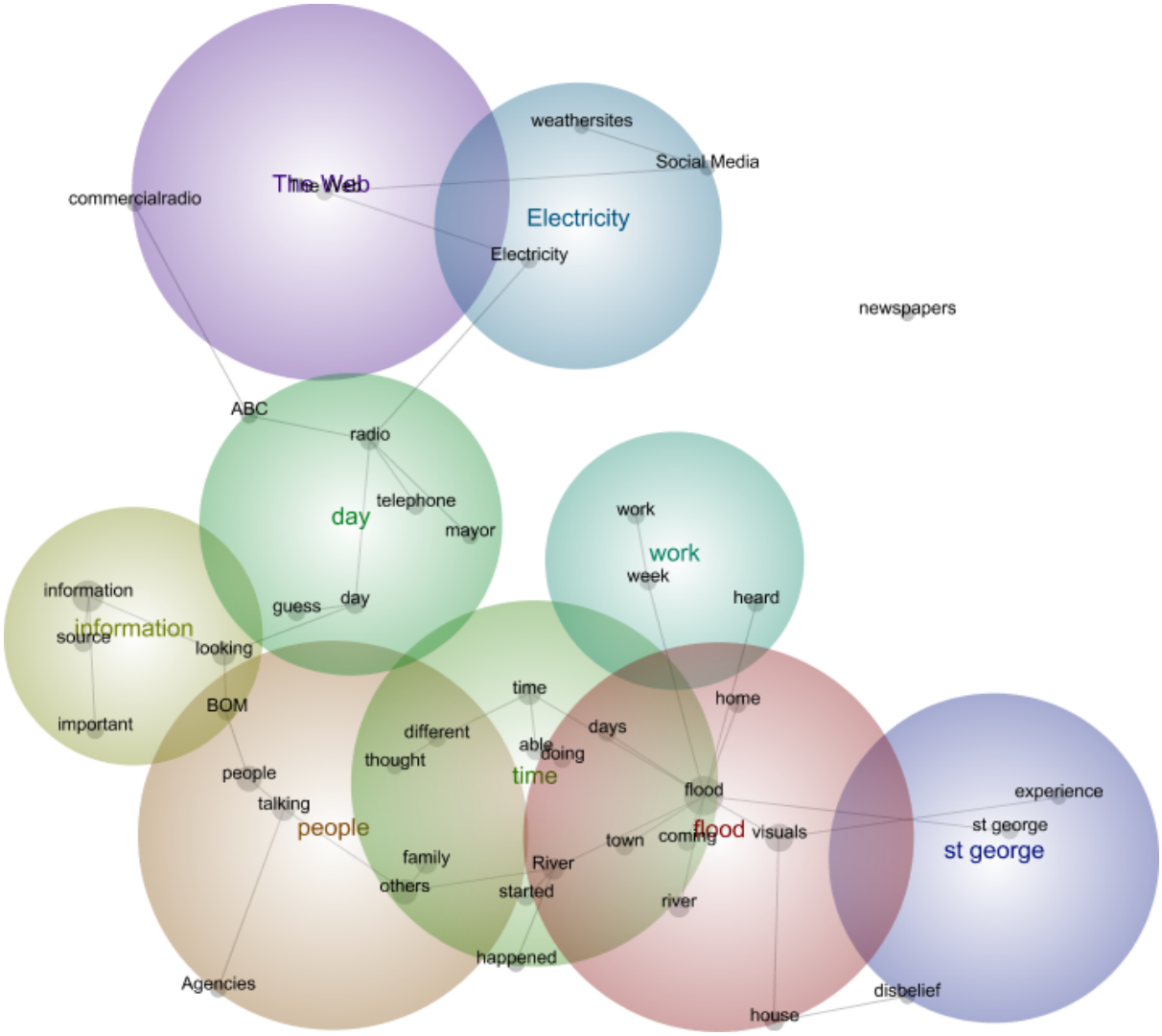



**Figure 4.8 St George slow flood concept map generated using Leximancer**

This map shows the clear relationship between access to the internet and the supply of electricity, which was cut to many of the respondents three days before the flood peak. It shows that the internet played a significant role in people's lives before and during the flood, so disconnection eliminated an important source that couldn't be replaced by mobile devices because of lack of mobile reception outside the town of St George. 'Time' was confirmed as a major concept and took on even more importance when the link to 'day' was

considered. However, there were no clusters or concepts emerging here that had not already been drawn out of the interviews during the manual analysis. Overall, the Leximancer analysis tended to confirm the concepts that were drawn from the manual analysis, as well as the connections between concepts, to the model presented in Figure 4.7 will remain unchanged.

**Slow flood interviews – a summary of their impact on this research**

The aims of the interviews and their analysis were to discover information seeking patterns and compare these against the original model, to determine if the disaster information seeking model was a reasonable framework for research in this field, and to guide development of a survey instrument for later use. Like the bushfire and cyclone interviews, the slow flood interviews established quite methodical patterns of information seeking that fit well into the disaster information seeking model. The slow flood interviews also produced new information for the survey, particularly the importance of local contacts within agencies, as personal contacts played an important part in the St George flood information network.

### 4.3.2.7. Bushfire

**The first alert and the problem at hand**

The first component of the model is 'the alert to the problem', in this case, 'the problem at hand', a bushfire at Gerogery. The most prevalent alert source was other people face-to-face, on a mobile telephone or fixed line phone, followed by environmental cues (seeing the smoke). The responses ranged from "I saw the smoke in the sky" (GF1), to "The farmer up the road here, his ute pulled in the driveway and he came in and told us" (GM2). Others were also notified by a spouse, neighbours and work mates. Table 4.15 summarises the alert and confirmation sources experienced by interview respondents.

**Table 4.15 Alert and confirmation sources for bushfire**

| | Commercial radio | Other people | Smoke | Total Alert |
|---|---|---|---|---|
| *Alert source/form* | *Confirmation source/form* | | | |
| ABC radio | | 1 | | **1** |
| Other people | 2 | 2 | 4 | **8** |
| Smoke | | 3 | 1 | **4** |
| **Total confirm** | **2** | **6** | **5** | **13** |

The first alert identifies the problem at hand, which in this case was the bushfire, and is the second component of the disaster information seeking model. After the first alert, the 'problem at hand' and the 'source preference criteria' are filters that determine how the individual proceeds to the confirmation information source.

**Source preference criteria**

In the disaster information seeking model, once the alert is received, the information seeking process then enters the filtering stage, where the activities and source/form choices of individuals are influenced by a range of factors. These were listed in the literature review in Table 2.3 and described as influences in the disaster information seeking model. They were: message and form features, the environment people find themselves in at that moment, social settings and ties, where they are in relation to the disaster zone, age, gender, education, ethnicity, resources, cognitive abilities, experience and locus of control.

While questions about source preference criteria were not specifically asked in the interviews, indications of influences on respondents' information sources did emerge. The source preference criteria of the bushfire interview respondents seemed to be strongly affected by the location of people at the time they heard about the fire and then sought more information, as well as the speed and proximity of the disaster and the environmental cues it produced. Every respondent described a rapid chain of events from the time they first heard about the fire, referring to time in terms of minutes or segments of an hour (e.g. half an hour).

Location was an important influencer. For instance, one of the local school teachers was at school when a farmer pulled in to warn him of the fire, but his colleague, who was not at work, overheard people talking about the fire while she was in another town. Three people were at home at the time of learning about the fire, eight were at work and two were in transit. All 13 respondents reported taking action immediately they heard about the fire by contacting others, turning on the radio or leaving their current location. This indicates a temporal aspect to the source preference criteria that links to proximity to the disaster, with respondents feeling more pressure to take action, but most wanting to get more information first. For example, GF3 saw the smoke as she drove toward her parents' farm and then telephoned her mother, who reassured her, so at that point she did not look for more information. It wasn't until she got to the farm and received news that one of the neighbours had telephoned telling them to evacuate that she left without looking for more information. Once individuals got further away from the fire, they returned to information seeking – this occurred with three of the interviewees. GF6 was influenced by her husband's wish for her to stay, and did not leave until she saw flames. She also evacuated, but started to look for more information as soon as she reached a place where she felt safe. She discovered her neighbor, (GF4) was doing the same thing.

> *…I pulled off to the side of the road, and for the first time thought where am I going? And I rang (GF4) because I didn't know where (GF4) was, and (GF4) said 'I am sitting on the side of the road out near that way too' (GF6).*

Availability of media was a key point in the Gerogery interviews. Other people and radio were the only sources considered in the first few hours, but little information was to be found on radio as the situation moved rapidly and the information provided on radio news became out of date. In two cases, the respondents could not make sense of the information as it conflicted with what they were seeing, so they stopped listening to radio. The speed of the disaster also may have affected the message accuracy, which affected the decisions of some respondents to listen to radio.

> *I listened to it at home for a good hour or so…it was ABC. She* (the announcer) *was going up East Gerogery and the direction didn't make sense (GM2).*

*…the biggest worry was listening to the wireless, they kept saying it was Gerogery West and I could see the smoke was up at Gerogery itself, but no, only that a neighbor rang up who had a relative in Gerogery West, he said it was on Patterson's (farm) and, God, that's what I thought (GF1).*

*Everyone was relying on wireless, the same message came on all afternoon (GF1).*

For four respondents, the stress of the situation made it difficult to listen to radio, so other people, including agency contacts, became most important.

*I could see it, it was quite visible in the distance, you could see it as I was driving down the freeway, and I actually came home – because it was a foul day I didn't listen to the radio particularly because I was concentrating on driving because when I come through there was branches falling on the car and all sorts of stuff. So I was just concentrating… (GF7).*

*The radio was on, but I can't say I was tuned in to it. I was more tuned in to what was happening with the mobile phones, and yeah, was anyone making contact with anyone and was anyone getting messages (GF6).*

The impairment of cognitive abilities was something not explored in depth during the literature review, but in this disaster showed its influence on preference for other people as information sources.

The close social ties of this community were evident throughout the interviews, although this may have been a function of the recruitment method, whereby most of the respondents knew each other.

*I think I phoned the neighbours, Terry Sullivan and Sue Collins, and she has got a business in town…and Terry rang his friend at Gerogery West and he was home and that was how, he sort of kept me informed to a degree, and then I think Leon Martin even rang to see how I was getting on because they wanted to know how I was doing with the cattle and things like that (GF1).*

*Well, Kim was there, Kim (neighbor) was our main contact. Kim rang me and said the Walla Tip's on fire…and then my daughter rang up, she was coming out to pick up Ava, and she said 'What's going on out*

*there?' She said 'There's black smoke everywhere'. Well once again Kim rang and said the tip's on fire, it's got away, but he did say it's probably not going to head in that direction (GF6).*

*And then just talking to the neighbours, we were just talking to neighbours, they were ringing up or you were ringing them and letting them know that we thought it was going to be okay, we're okay (GF4).*

However, many of the respondents made use of other people not in their social network as sources of information, particularly police at roadblocks, council workers acting as support for the Rural Fire Service, and firefighters themselves.

*…fire trucks were coming and filling up there as well. So they were giving us – people we knew on the fire trucks were also giving us news of what was going on …quite a few of them were locals or in trucks, yeah, our neighbours and bits and pieces from around the place (GM4).*

*By that time I saw someone arriving at the fire station so I went straight over there and spoke to the captain and I said I was on my way into town and that was how I happened to be there at a quarter to two, I think, and he said it was spotting 6kms ahead, stay home and watch spot fires (GF1).*

*It (Facebook) must have mentioned that the school had gone and I said that the pub had gone. The policeman said…'well I can tell you that's not true, because that's our base and I just got off the phone there, so the pub hasn't gone' (GM2).*

There was some frustration when residents discovered that Rural Fire Service and police personnel had no information.

*…a lot of the community were down there (at the road block), a lot of other wives and people were pulling up and we just stood there trying to get some knowledge of what was going on (GF7).*

*They (fire crews with tankers) didn't know anything either. The whole thing was the…well it was a disaster but blame the communications. There was a fire truck sitting down the road, and a fire truck sitting over there, and they didn't know what was happening…(GM3).*

Locus of control, combined with gender, seemed to influence both activity and information seeking. Four of the men had the right firefighting equipment and took action to fight the fire or prevent its arrival, and each stopped looking for information at that point. They did, however, receive information via mobile phone calls and texts, or via UHF radio in their vehicles.

> *No, I had no way to communicate with anyone except Jarrod's phone if someone rang him type-thing, that was it, but we saw the fire trucks and we just sort of helped out from there in the fire (GM4).*

GM3 also got information via GM4's son's mobile phone.

Closely tied with locus of control was experience – although few of the respondents mentioned previous bushfire experience explicitly, there was an impression through the actions of many that they had experienced bushfire before, were prepared in some way, or at least knew what to do. This also showed that many in the community were well-resourced, which allowed them to make decisions to actively help. One of the respondents was a Rural Fire Service volunteer, and he, plus the four individuals with firefighting equipment had the resources to deal with the disaster, and were attempting to take control of their situation (internal locus of control). They all described the path of the fire, the influence of the weather and their equipment with some knowledge of what the fire would do in certain circumstances, and what they could do if certain situations arose. This was from one of the men who stayed to defend his property:

> *I had the fire-fighting unit and my first point of call was up to Dad's, which is sort of up that way (in the path of the fire) GM1.*

And from several farmers:

> *I started to get some hoses and things organised over there. The fire at that stage, it was…going straight east and I didn't, I still thought then that we were going to miss it even though it was pretty close…(GM3)*

> *Yeah, by the time you got home, and got the fire pump and everything on it, it was all hooked up, you just had to drag it off and go…(GM4).*

Their activity showed inter-relationships between influencing factors. In these interviews, locus of control, resources and experience were very closely linked. The experience of other communities outside the area was also uppermost in the

minds of some closest to the fire, with two of those interviewed mentioning King Lake, a village badly affected by the Black Saturday bushfires in Victoria in 2009, the year before the Gerogery fire.

The way resources were used in this bushfire did not reflect the way resources had been considered in the literature review, where resources were generally linked to the financial ability of research respondents to deal with evacuation. Here, resources meant having the equipment and means to fight the fire, build fire breaks, move stock and help others.

While not all the influencing factors identified in the disaster information seeking model in Table 2.3 in Chapter 2 were evident from these interviews, many were obviously a factor in the behaviour of the respondents. From the descriptions of the participants, some of the factors clearly influenced their choices of information source. Key among these were:

- availability and accuracy of information;
- proximity to the disaster (and therefore activity relating to the disaster);
- cognitive abilities;
- experience;
- gender;
- social ties;
- resources; and
- locus of control.

The next section will examine further the next stage of the model the confirmation sources and main sources and start to plot source sequences of the bushfire respondents.

**Information source horizons and source sequences**

All 13 of those interviewed at Gerogery fell into a pattern of information seeking that included pauses for some type of action. They referred regularly to the smoke or fire, other people and radio to update themselves on the progress and path of the fire, and the welfare of other people.

> *…I was obviously watching the fire and smoke and which way it was going and that sort of thing…I just sat in the car and watched for spot fires. I did that all afternoon and I mean I could see the smoke and it*

*would be brilliant white and then brilliant black, and I thought what the hell is going on? (GM1).*

*I know that I was sitting at home for a while going, 'I wonder what is happening' and that was when I put the radio on (GM2).*

*Yes, in the vehicle I had it (the radio) on, and I sort of sat out on a boiling hot day and not much shade at my place, and you had to be where you could sort of see it (GF1).*

Every interviewee contacted other people for information and to pass on information. This process emerged as a recurrent loop for many of the interviewees, particularly those not actively involved in combating the fire.

Nine of the interviewees did not listen to radio at all during the incident. One respondent who left his workplace in Gerogery to return home seemed pre-occupied by what other people were doing and didn't think to put the radio on.

*No, (I wasn't listening to the radio) but I was looking in the rear view mirror going 'why are these cars passing me' going that way when you can see that you can't see the road because of the smoke (GM2).*

Four people turned eventually to radio, listening to ABC local radio, which is the Australian national emergency broadcaster, and two commercial radio stations. Each of the radio listeners commented on the inaccuracy of the geographic information and/or the lack of currency of information, although several said they would rely on radio if a bushfire was to happen again.

*The ABC was saying Gerogery East, Gerogery West residents evacuate. And they didn't mean that at all. They (Gerogery residents) were fine, only the people on Gerogery West Road (GF8).*

*The west side of Gerogery evacuated and there's no question that when the Rural Fire Service, because they have got logs of what they actually said, they said quite clearly it was on the Gerogery West Road, the fire was (GM5).*

Of the people interviewed, two received the automated text/phone message generated and sent by Rural Fire Service. The predominant source of information at any stage of the fire was friends, family and neighbours, with every

respondent mentioning such contact in their information seeking pathway and eight respondents of the 13 alerted to the fire by other people. Four interviewees commented that they were too busy defending their property to be actively looking for information but that people rang them on mobile phones and from those calls they received a form of update.

The most common pattern to emerge was an alert by other people; then to check on the location of the fire via a search for the smoke; and then use regular updates from other people to keep track its progress. The second most common pattern was to discover the fire visually then check with other people for more information and then use others as a form of regular update, usually friends or family close to the fire zone. Radio was the other main source, with one respondent alerted by radio, two using it as a confirmation tool, two people using it as their most important source and five using it as a key source. Table 4.16 provides the detail of alert and confirmation sources.

**Table 4.16 Alert and confirmation sources during the Gerogery bushfire**

| | Commercial radio | Other people | Smoke | Total alert |
|---|---|---|---|---|
| *Alert source/form* | | *Confirmation source/form* | | |
| **ABC radio** | | 1 | | 1 |
| **Other people** | 2 | 2 | 4 | 8 |
| **Smoke** | | 3 | 1 | 4 |
| **Total confirmation** | **2** | **6** | **5** | **13** |

One of the interesting points emerging from the bushfire interviews was the number of sources used by each respondent. This was counted for each disaster type, but was, at best, an estimate because of the time lag between the disaster and the interviews. Even an estimate, however, is useful to make comparisons between the four disaster types. The average number of sources recalled by respondents during the bushfire was 2.62 discrete sources per person, with fewer sources used by people geographically closest to the fire, especially those involved in fighting the fire or protecting their property. The most important source in the Gerogery bushfire was 'other people' followed by 'seeing the smoke or flames'. Table 4.17 shows all of the options of information forms or sources

mentioned during the interviews, with the bushfire sources highlighted. 'Other people' dominate the source list.

**Table 4.17 Most important information sources for the Gerogery bushfire**

| | Fire | Cyclone | Flood | Flash flood | Total |
|---|---|---|---|---|---|
| **Other people** | **7** | 2 | 8 | 2 | 19 |
| **Environmental cues** | **4** | 0 | 0 | 0 | 4 |
| **ABC radio** | **2** | 1 | 3 | 3 | 9 |
| **Commercial radio** | **0** | 4 | 0 | 0 | 4 |
| **Emergency agency** | **0** | 0 | 1 | 0 | 1 |
| **Council or SES** | **0** | 0 | 1 | 0 | 1 |
| **Non-emergency agency** | **0** | 0 | 0 | 0 | 0 |
| **BOM website** | **0** | 2 | 0 | 0 | 2 |
| **Agency website** | **0** | 0 | 0 | 1 | 1 |
| **Other website** | **0** | 1 | 0 | 1 | 2 |
| **Agency social media** | **0** | 0 | 0 | 0 | 0 |
| **Television** | **0** | 1 | 0 | 7 | 8 |
| **Newspaper** | **0** | 0 | 0 | 0 | 0 |
| **Social media/email others** | **0** | 0 | 0 | 0 | 0 |
| **Total count** | **13** | **11** | **13** | **14** | **51** |

### The sense-making loop

The disaster information seeking model featured a feedback mechanism from any stage of the model back into the information seeking process, which included re-consideration of the influencing factors. This was evident in the bushfire at Gerogery, especially with those who were not active in fighting or dealing with the effects of the bushfire. Most fell into a pattern of information seeking that validated the sensemaking loop that features on the disaster information seeking model. They referred regularly to the smoke or fire, other people and radio to update themselves on the progress and path of the fire, and the welfare of other people. GF3 describes how she collected her daughter from her parents' fire-affected property and once she got home, she called her parents periodically, not

always making contact. To fill the void, she turned on the radio and also checked the Rural Fire Service website, but was unable to get any new information and so called her parents again. This indicates that the sensemaking loop is activated in the cases of both new information and no information at all. Her experience also shows that certain information (seeing the smoke on the way to her parents' house and then hearing their news) triggers action (taking her daughter straight home to a safe town), and that the information seeking process, including sensemaking, starts again once the action is complete (calling her parents, listening to the radio, checking the RFS website).

This was also the experience of others. GM2 heard about the fire when a local farmer called in to his work and he confirmed it by going outside to see the smoke. This triggered his evacuation from work in the affected area and his return to home in a safe town 30kms away. He didn't remember listening to the radio on the way home, so his resumption of information seeking did not occur until his evacuation was complete and he was safe. He then talked to his wife, listened to the radio and subsequently went to a service station to which Gerogery residents had evacuated. Once there, he got more information about the fire and also heard a rumour that his workplace had burnt down, at which point he started the information seeking process again by making some telephone calls and consulting police who were at the service station. When he confirmed his workplace was safe, his information seeking focus shifted to the safety of local families and their properties and his information seeking process started anew.

The sensemaking process occurred regularly through the interviews, and had different outcomes. In some people, information triggered action – preparing to or fighting the fire, moving stock, evacuating - such as GF1 (moving stock), GM1, GM3, GM4 and GM5 (preparing to fight the fire or fighting it). Another felt she had enough information and did not take action or seek further information despite heavy involvement of her family and eventual direct effect on her property (GF2). The third course was receiving information that prompted the search for more information – it was this process that involved the sensemaking loop and involved the remainder of the interviewees.

**What people were looking for**

The Gerogery bushfire interview participants were interested principally in where the fire was and where it was going. However, the safety of friends, family and neighbours was also important and eight of the most closely involved respondents reported their friends, family and neighbours checking on them. Many of the respondents reported being alerted by neighbours who were checking on their welfare, and four reported going to a friend or neighbour's place with firefighting equipment.

> *People were ringing from everywhere (GF6)…yeah it was driving me ballistic (GM3).*
>
> *I went round with Sarah then to the other neighbours to check they were okay, and say hello and see if they were alright (GF7).*
>
> *I think (GF4) was ringing (GM1) as well, I just can't remember totally that, and then she rang her sister and things like that. I think they sort of live over the other side of the fire, I think somewhere near Walla…(GF7).*

Data on what people were looking for and how many of the interviewees looked for this type of information is contained in Table 4.18.

**Table 4.18 What people were looking for during the bushfire**

| Information sought | Number |
|---|---|
| Where the fire was and where it was going | 9 |
| Whether family and friends were OK | 7 |
| What to do/how will it affect me? | 3 |
| Where there was somewhere safe to evacuate to | 1 |
| Road closures | 1 |

### 4.3.2.8. Effect of bushfire interviews on the disaster information seeking model

The information distilled from the Gerogery bushfire interviews was applied to the disaster information seeking model that was developed in Chapter 2.

The alert sources were discovered (smoke, other people, radio), some factors affecting source preferences in a bushfire (including the type of disaster) were drawn out, and then the confirmation and main sources (radio, environmental cues, other people) for this group of people were identified. In addition, a number of possible source sequences were plotted. Application of the bushfire information seeking activity to the model creates a map of this activity and is depicted in Figure 4.9.

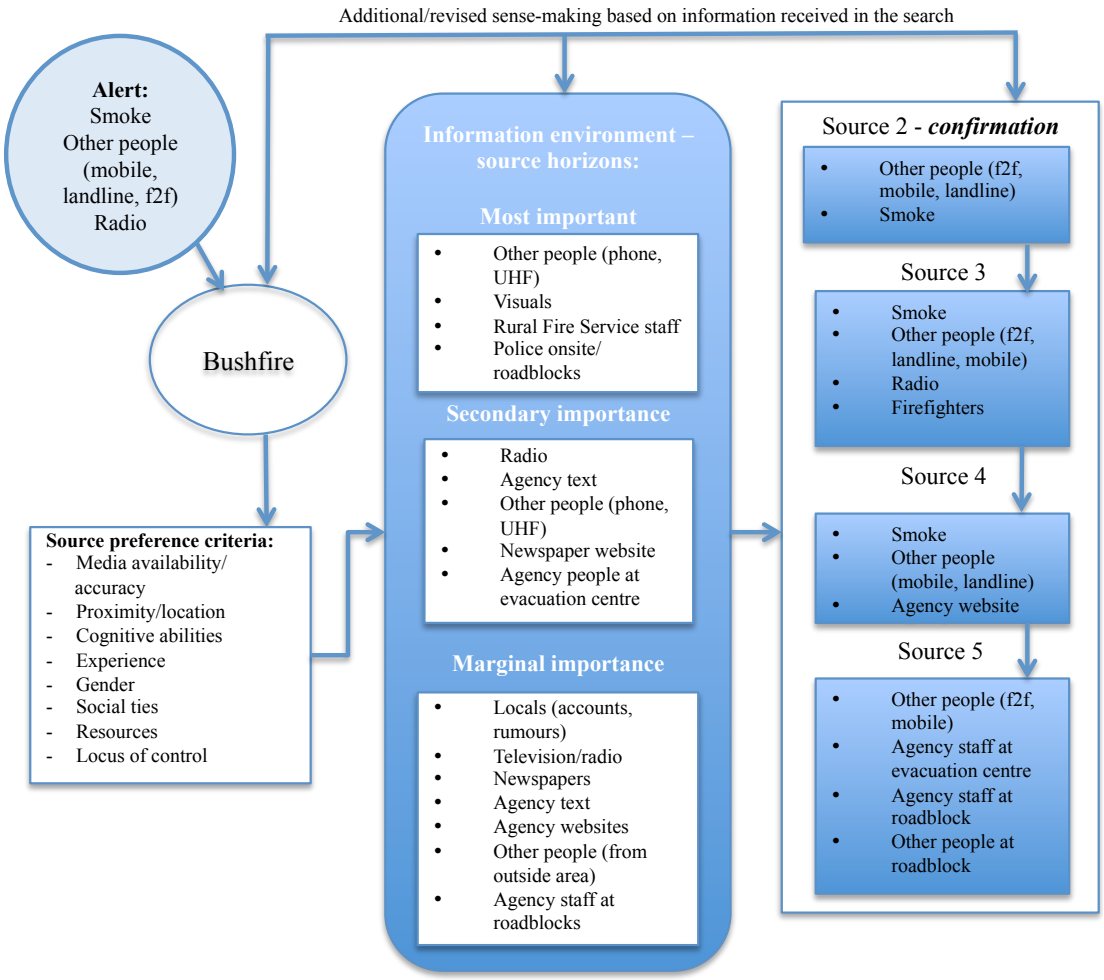



**Figure 4.9 The bushfire information seeking map based on information from the interviews**

This application of bushfire information to the disaster information seeking model shows a heavy reliance on just a few sources, and distinctive differences between the sources that reside in each of the three source horizons. Savolainen's problem-specific every day life information seeking model indicated that a source would probably appear at all three levels of importance for a community. The bushfire results indicate that individual sources had a consistent level of

importance across all of the interviewees. If they had differing levels of importance to different people, individual sources would have appeared in all horizons in this model. The other feature to note was the graphic representation of the relatively small number of sources identified by the Gerogery respondents. Their average number of sources was 2.62 per person, and these sources were shown in the model to be fairly similar for each of the respondents.

### 4.3.2.9. Confirming the bushfire interview results

The next step was to run the Gerogery bushfire manuscripts through the qualitative computer software, Leximancer, to discover if concept mapping could produce insights that may have been overlooked in the analysis against the disaster information seeking model. Reasons for the use of this software, and support for its reliability, were explained in Chapter 3 - once the first two stages of analysis were complete, the data was processed by Leximancer. The results were represented by a connectivity table and a diagram showing the importance of themes and their connections, and were compared with the results from the first and second stages of the analysis and the resulting model in Figure 4.3. Each of the most connected themes was investigated against the first stages of analysis to ensure they had been accounted for in these stages. Some themes emerged as significant in the Leximancer analysis, but were not considered in depth in the first two stages of the analysis. This section will describe how this was done and what was found.

**Preparation of transcripts for use in Leximancer**

The first run of the concept map showed that the bushfire file required some cleaning. A number of words – 'probably', 'everything', 'things', 'stuff', 'trying' – came up as themes while appearing to be semantically weak. The word 'cyclone' appeared because it was included in the user-defined list that was to be used across all of the files in the project and two of its identifier terms, 'track' and 'strength' appeared in the bushfire transcripts. Each concept was investigated further by inspecting each occurrence that was identified and detailed in the ranked concepts list.

'Probably' was used often during the transcripts, usually in utterances unrelated to information seeking, for instance "…it took me probably just as long…" (GeM2) and "Yeah, probably the same…" (GF4). GF1 used the word as an

affirmative answer to a question, which indicates some link to memory of the incident, but not tightly related to information seeking. For this reason, it was decided to add 'probably' to the stop list, which would prevent it from being recognised as a concept.

'Everything' was used as a general quantifier, for example, "…as far as the cattle and everything was concerned…" (GF2) and "…was everything OK…" (GF3). This word was added to the stop list.

'Things' and 'stuff' were also words of low semantic value used to described general, but un-named, ideas. They were used, without exception, to give an idea of scope or volume to an action, thought or occurrence, as in "…what I was doing with the cattle and things like that…" (GF1) or "…or stuff like that." (GF2). Both were connected to other semantically important words (such as 'power', 'word of mouth', 'rumours') that would appear on the concept lists if mentioned regularly enough by themselves. Both words were added to the stop list.

'Trying' indicated efforts to contact people, find information or to get somewhere and for this reason it was considered an important word to leave in the map. Examples of the use of the word included "…trying to come along the railway…" (GF5), "…we were trying to contact…" (GM4) and "…Helen kept trying…" (GF7). There will be more detail on features of this concept in the discussion of results.

Similar reasons justified the removal of the words 'knew', 'heard' and 'saying', which appeared at different stages as themes within the bushfire concept map without contributing to an understanding of the semantic relationships.

Finally, in order to successfully report the influence of other people such as neighbours, friends and family, it was necessary to comb through the transcripts a final time to collect the names of these people who had been a source of information for each individual, to enter these names into the thesaurus, and then to merge them with the existing concept, 'others'.

**Generation of the Leximancer concept map for bushfire**

Once these manipulations were complete, the final concept map was generated, which was included below in Figure 4.11, with its concept hierarchy in Figure

4.10. 'Visuals', which included smoke and other environmental cues, dominated, along with 'other people', and confirmed the alert and confirmation sources discovered in the manual stage of the analysis.

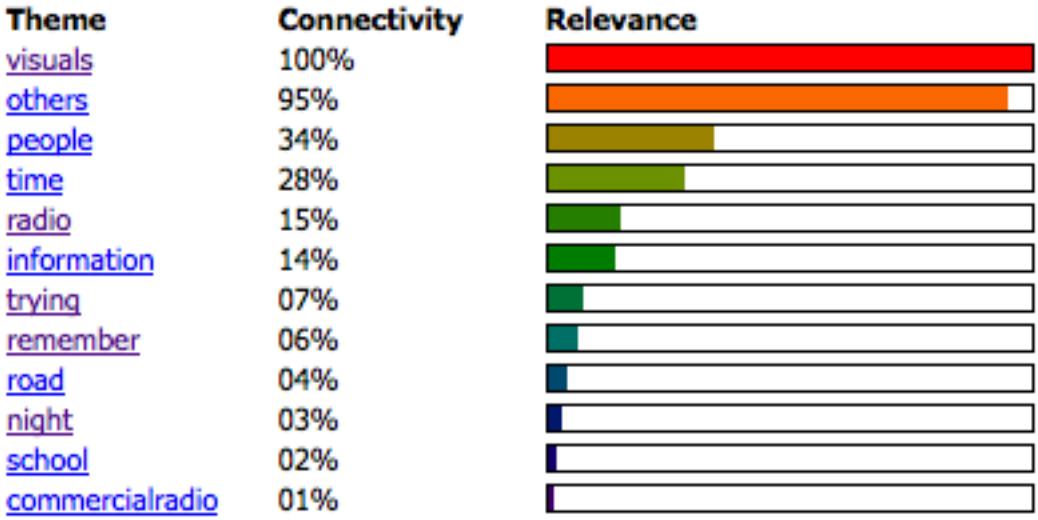



**Figure 4.10** **The hierarchy of concepts for the Gerogery bushfires generated using Leximancer**

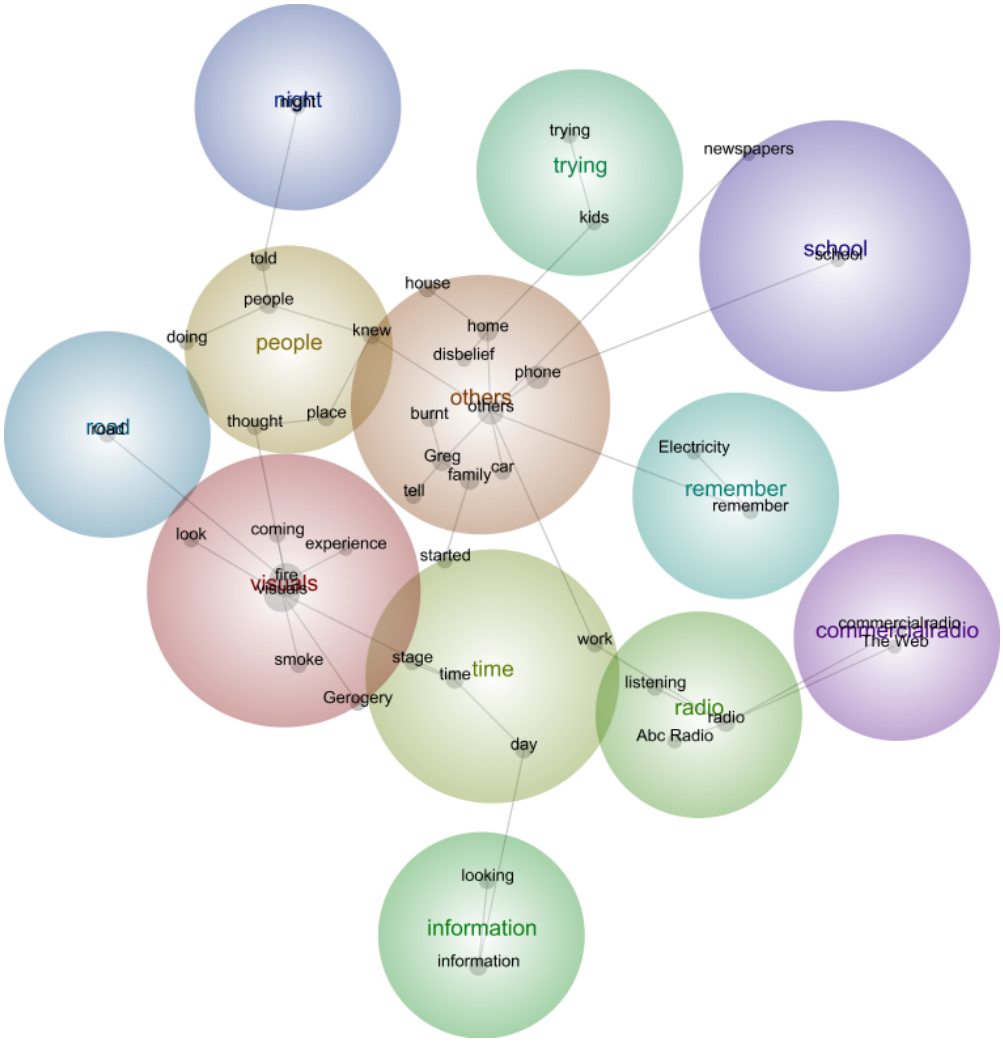



**Figure 4.11 The concept map generated for bushfire using Leximancer**

This map shows the focus of the interviews on the information sources 'others people' 'visuals' (smoke) and 'radio'. However, there are two aspects of respondents' behaviour and attitudes shown in this concept map that were overlooked or not given enough emphasis in the manual analysis against the model: the importance of time during the information seeking process, and the magnitude of the effort to get information or take action, which was represented by the theme 'trying'. While the temporal aspect of the information seeking process was recognised in the first stage of the analysis as possibly an important function of proximity and information seeking, the concept map shows that time is of more significance than first imagined, with connections to 28% of the other themes. It related to the speed of the disaster, references to increments of time by respondents, and also the period over which the respondents dealt with the disaster.

> *So my son got to the end of the road, this end of the road, because he came the back way and he wasn't able to get down. So, where he was, he could*

*see the line that the fire was blowing because it was moving that fast (GF2).*

*So, that would have been half an hour after that…was it about three o'clock when you spoke to me to say you were going out to fight the fire with your dad? (GF2).*

*Well, it would have been, like I got home at two, like I reckon 2.30, 2.45, you would have been gone I reckon (GM1).*

*And then I don't know what time the fire passed, I have no idea really. So two, three thirty, four – three-thirty maybe…it all happened fairly quickly (GM1).*

*I don't know, I might have been home about two thirty, three, so it might have been an hour later, say four, yep (GM3).*

*We had a little bit of a shower about, what was it, ten or eleven at night, and that's when Jeff went home wasn't it? Then you stopped (GF6 talking with her husband).*

*I waited for these guys (husband and son) to come, so I think we pretty much went to bed about the same time (GF7)…It would have been about midnight I think (GM4).*

Time would be therefore be an important inclusion in the disaster information seeking model, as the interview transcripts indicated that not only did time pressure seem greater the closer people were to the seat of the disaster, but the passing of time affected their behaviour patterns. For instance, the transcripts showed that nine of the 13 interviewees changed the purpose of their information seeking as time passed. The second theme that emerged in the concept map that had not been obvious in the manual analysis of the interviews against the model was 'trying'.

'Home' (a significant concept occurring in the 'others' theme) linked with 'kids' inside the 'trying' theme, demonstrating priorities in a high pressure situation, and again importance of time. According to their comments, respondents were either trying to get home, telling the story of their spouse trying to get home, looking for information about how their place might be affected, or they were

protecting their home, all the while realising that the fire could directly affect them at any moment:

> *So he tried to come home and of course he couldn't come home, because the police, well they even stopped Greg at the corner and Greg said sorry mate, I am going through, that's my house over there and I don't care what you tell me and what you say, and going to my house (GF2).*

The prominence of the theme 'others' in the 'trying' network showed the importance of information from other people to achieving aims that day and the secondary linkages to the theme 'time'. The theme 'trying' also indicated some sort of action by respondents and their families, neighbours and friends, which could be linked to triggers for action provided by information that people receive during the process being examined here. Further examination of the purpose of 'trying' to get somewhere, get information, or protect themselves and their property, and the outcomes of this effort, could provide answers on 'why' people look for information and why they take the action that they do, but this study is focused on 'how' people look for information rather than the motivations for doing so. As a result of the application of Leximancer analysis to the disaster information seeking model, a temporal component will be added to represent the impact of time on information seeking behaviour. This is represented in a second version of the bushfire information seeking model, in Figure 4.12.

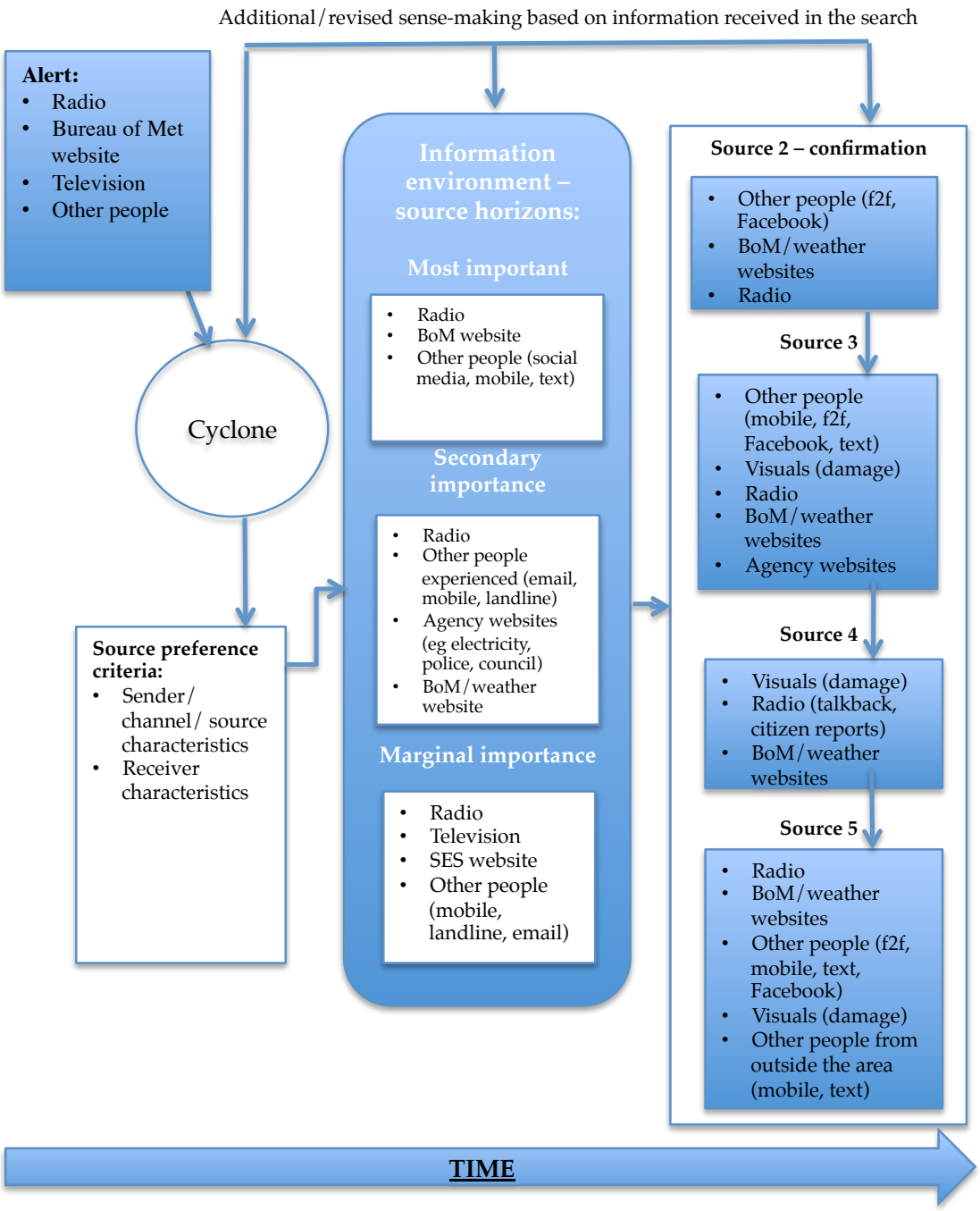



**Figure 4.12 A bushfire information seeking model including the concept of time**

### Bushfire interviews – a summary of their impact on this research

The aims of the interviews and their analysis was to discover information seeking patterns and compare these against the original model, to determine if the disaster information seeking model was a reasonable framework for research in this field, and to present and to provide guidance in the development of a survey instrument for later use. This version of the model shows that the information

collected in the bushfire interviews on information behaviour sits realistically within the disaster information seeking model developed in Chapter 2. Not only that, but it shows a range of different information seeking pathways and options that can emerge during a bushfire, which could be used as a foundation for survey questions. The most significant of these were the importance of other people, which was not emphasised in the literature review to the degree that emerged in the interviews, and face-to-face contact with emergency agency people.

#### 4.3.2.10. Cyclone

**The first alert and the problem at hand**

The most prevalent alert source for Cyclone Ului at Airlie Beach was the Bureau of Meteorology website followed by radio. Others learned about the approaching cyclone from television and other people. The responses ranged from seeing the cyclone on weather website maps (ABM3) two weeks out to learning about the cyclone two days from impact (ABF4, ABF3). From the alert component of the model, the information seeking process seemed to be filtered by the disaster type and then source preference criteria. This will be explored more later in this chapter when the analysis of the interviews is complete.

**Source preference criteria**

Before investigating the confirmation and other sources used by the cyclone interview respondents, a number of source preference criteria that might affect source and form choices were investigated, based on the list of possibilities discovered in the literature review. These were: message features such as the source itself and availability, clarity, frequency, consistency, accuracy, certainty and the level of guidance in the message; the environment the individual is in; social setting and social ties; proximity and location; age; gender; education, race/ethnicity; resources; cognitive abilities; experience and locus of control. A number of these message characteristics were identified in the analysis of the transcripts of the cyclone interviews: message source/form (the type, availability to respondents); message consistency; message accuracy; message clarity; and message frequency. The characteristics of the respondents that could be identified were: social ties; location; resources; cognitive abilities; experience and locus of control. As with the bushfire interviews, message and sender characteristics were identified from each participant's answers to questions about

their information seeking, and therefore the influences observed, rather than specific questions posed to each person.

The message characteristics were dominated by several features, and mentions of each occurred more regularly as the respondent's story moved closer to the point of impact of the cyclone. Three dominant concepts were related to time pressures and also availability of detailed information – the availability of the source or form, message accuracy and message frequency seemed to be important factors for people returning to their key sources.

> *We got the kids settled into our room and we just had Austar going, just the weather channel, that was the only thing we had on. We were constantly watching that because that was a constant update, like it was minute to minute, so we had all that time. So we knew roughly when we were going to get hit (ABF5).*

> (The respondent got from the Bureau of Meteorology) *…just basic news mainly – what pressure it was, capacity, where it was, which way it was moving, how fast it was travelling.* (Then, talking of a NASA weather website)*…it's more precise…it gives you different colours of the weather and the rain and the water on it. And you actually seem to be looking right down at the eye of it (ABM4).*

> *They* (radio) *would have been, they come in and give those reports I would say every half an hour. Where it is now, where it is now, at least every half an hour. Especially when it started to get close to land. They were extremely, they were very helpful (ABM6).*

> *…sort of twice an hour, three times an hour, they were putting out bulletins and information about sewerage in the water and all that stuff, and water might get cut off. So I think we had more than enough there, we were really content…(ABF1).*

ABM4 was then forced to go to battery-operated radio when the power went out:

> *(Once the power went out) we were just basically waiting for it to hit and just listening to the radio, we had battery-operated radio. I've got to admit the radio reports didn't keep it up to date (ABM4).*

The message characteristic of availability became important in the cyclone, either because there was no access to a source, such as when the power went out during the storm, or because there was no new information available. Most people had access to power or a battery-powered radio, which became the key source, but some found there was not enough updated information:

> *We all had access to all this information, or the ability to get information, and no-one was giving it to us, I think it was very frustrating…access to websites and things, just being able to communicate was good, but to find information would have been heaps better (ABF3).*

> *It was not knowing when the electricity would come back on was a big issue, because you couldn't plan anything and you wouldn't buy groceries, or you wouldn't buy anything...the lack of information for when it would come back on was pretty big (ABF3).*

Many respondents turned to radio when the power went out, and identified as very helpful the reports of people telephoning in to radio stations from around the district as because they were able to put the spread of the storm and its severity into some context. This source became valuable for its accuracy and for the frequency of updates. It also indicated that the situation of the individual would guide source or form preferences – here is an example:

> *Yeah, I guess you get first hand of what the people in different areas, the way they were going, because you could pinpoint where they are in the community. So if the people in the top of Mackay are calling up and they're saying they've got 120km winds sitting there, then you can sort of just say, 'well, okay, it's starting to come in'. And if the eye was coming over us we knew that we were on the southern end of the eye, then it was pretty big scope we were going to have (ABM3).*

This use of experience to interpret messages and choose sources was prevalent throughout the interviews at Airlie Beach, with the exception of two respondents who had not lived in the area for long. In fact, experience was a feature that came up most often, closely connected to locus of control. For example, those with experienced tended to undertake preparation work, help others and be well-equipped for the consequences of the cyclone (such as securing a generator and supplies of water in case the power was cut).

*Knowing that we had a cyclone that hit us here quite a few years ago that actually developed in the same area…so I guess we all of a sudden said, 'well, we are going to get clobbered with it, so let's just prepare for the worst and hope for the best' (ABM3).*

*At that stage I'm Bureau of Meteorology orientated and I can gauge, and we did, within virtually minutes of when it was going to hit. So I could see the process, I knew exactly what speed it was doing. I knew what intensity it was and I knew what to do about it, and we did do something about it (ABM5).*

*I prefer to rely on the information I get from the authorities and also from what I know myself from my own experience (ABM1).*

However, the feature of experience also covered lack of experience, and in this case it affected the way at least one respondent searched for information. She hadn't been through a cyclone before, and this is what she did on learning about it:

*And then I rang my brother because he is local and I said, 'do I need to panic? Do I need to panic?' because that apparently happens quite a lot up here, cyclones out there, and a lot of the locals went 'nah, it will turn around and go away'. So the locals were not worrying about it at all, but it was people like myself and a few other mums that just moved up that were like, 'oh my god!' …he* (brother) *said the same thing, not to worry about it (ABF5).*

Neighbours and relatives seemed most often used in the process of seeking information to get back to normal by those with no experience:

*Ergon* (electricity company) *came out, I think it was about 12 days after I had power, and even then, my ex-husband is an electrician and he came out and he said, 'to keep it safe I was just going to put one power point and that's all you can have because there's that much damage', but I had no water because I had no power (ABF4).*

Preparing for the worst and dealing with the aftermath involved a series of preparation activities that many interviewees presented as routine, but also

involved using or procuring resources, which was another important influencing factor for information seekers from the literature review:

> *In that case, we have already done that, we have bought some extra power packs, extra batteries, I've got bigger ones in the cars ready to go, I bought an extra fridge-freezer but that was all in case…but then we also go camping quite a lot so it's stuff I'm going to use anyway while away camping (ABM3).*

> *…I was keeping three houses going. The generator could only run two, so then I would shift mine over and give a couple of hours to the person next door so they could have their fridge going too (ABM6).*

Others welcomed the contact with other people that radio provided during the blackout, which brought cognitive abilities into the cyclone picture, and the ability of the respondents to cope with the stress of being in a category four cyclone:

> *Yes, because my son actually rang them at some point, they were talking to him through it all, and he would say, 'yeah, we've just had a window smash and trees on the roof'. Se they were still in contact with him, which was good (ABF4).*

Another influencing factor that emerged that did not relate to media features was the social cohesion of the community. Social ties were identified in the literature review as a possible influence on information seeking behaviour, and this was supported during the interviews. There were constant references to family as information sources, and neighbours were also featured as information sources and a source of help or requiring help.

> *It became a really social community – people that I didn't even know, I know they live in town, but they were texting me going 'don't forget petrol' and I was like, 'yeah petrol!'…Yeah, we all met up at Fish Divine, because it was the only restaurant that had a generator, and we would just go in …and the waitstaff would tell us what other people had said, and we were telling people, and then the tourists were talking to tourists. It was funny, because the kids actually…everyone was bringing their kids in just to try and get them out of the drama of it all, to have some normalcy (ABF3).*

> *I guess from my point of view, it* (his wife being an SES controller and his previous experience) *helped our neighbours then, because some of our neighbours had never been through a cyclone before and we found that they were coming to us and asking for advice knowing that we'd both been through them before (ABM3).*

One of the factors influencing information seeking that was mentioned earlier was cognitive ability and its effect on selection of information sources. This was evident in the locals who assured the respondent new to town that the cyclone would 'turn around and go away', as well as the general preparedness of most of the respondents, which is expected in tropical places such as Airlie Beach where cyclones are a regular feature of each summer. The pressure of the situation did not seem to affect the ability of respondents to absorb information as it did in the Gerogery bushfires.

The interviews indicated that a number of influencing factors came into play in selecting information sources in a cyclone. These were, in order of the number of times they emerged:

- locus of control:
- experience:
- message frequency;
- message accuracy;
- message/source availability;
- resources;
- social ties;
- location/situation; and
- cognitive abilities

Influencing factors that were not evident from the interviews, mainly because questions that might have identified them were not asked, were:

- other message features such as clarity, consistency and guidance;
- social setting;
- age;
- gender;
- education; and
- race/ethnicity.

**Information source horizons and source sequences**

Once hearing about the cyclone, eight of the 11 respondents went either to the Bureau of Meteorology website or some other weather website to confirm and then check on the cyclone's progress. The results for the most important source was spread – five people used radio (four of these commercial stations), three people used weather websites, two people relied upon other people and one person relied on television. The sources chosen generally reflected whether the respondents lost power. Radio was the most important source for all of those who lost power, either through their car radio, or via a radio with batteries.

Information seeking at Airlie Beach stopped either when the power went out late on Saturday March 21 or when radio stations stopped giving live bulletins late that night. Information seeking generally started again the next morning with most of the interviewees looking around outside after the impact and checking on neighbours, family, friends and their workplace. From that time, radio was the most popular source and those that used radio commented that reporters on the ground and call-ins from people around the area (citizen reports) gave them the most valuable information that allowed them to construct a picture of the damaged area and then put into context some time frames for restoration to normality.

The most common information seeking pattern to emerge was to hear of the cyclone via media or regular checks of a weather website and then to confirm via a weather website and other people. Those who confirmed with other people had access to people that they considered experienced in cyclone, such as a relative who had been through one, or for one respondent, members of the commercial fishing community.

Table 4.19 illustrates the alert and confirmation sources, showing the most popular combination to be the Bureau of Meteorology website with other websites as the confirmation source.

**Table 4.19 Alert and confirm sources for Cyclone Ului at Airlie Beach**

| | Other people | BOM website | Other website | Alert totals |
|---|---|---|---|---|

| *Alert source/form* | *Confirmation source/forms* | | | |
|---|---|---|---|---|
| ABC radio | | 1 | | 1 |
| Commercial radio | 2 | | 1 | 3 |
| BOM website | | 1 | 3 | 4 |
| Television | | 2 | | 2 |
| Social media / email others | 1 | | | 1 |
| **Confirm totals** | **3** | **4** | **4** | **11** |

Table 4.20 shows the most important sources for all interview participants, with the Airlie Beach cyclone sources highlighted. Radio was the key source with five of the 11 participants selecting this as their most important source of information.

**Table 4.20 Most important information sources/forms during Cyclone Ului at Airlie Beach**

| | Fire | Cyclone | Flood | Flash flood | Total |
|---|---|---|---|---|---|
| Commercial radio | 0 | **4** | 0 | 0 | 4 |
| Other people | 7 | **2** | 8 | 2 | 19 |
| BOM website | 0 | **2** | 0 | 0 | 2 |
| ABC radio | 2 | **1** | 3 | 3 | 9 |
| Other website | 0 | **1** | 0 | 1 | 2 |
| Television | 0 | **1** | 0 | 7 | 8 |
| Emergency agency | 0 | **0** | 1 | 0 | 1 |
| Council or SES | 0 | **0** | 1 | 0 | 1 |
| Non-emergency agency | 0 | **0** | 0 | 0 | 0 |
| Visuals | 4 | **0** | 0 | 0 | 4 |
| Agency website | 0 | **0** | 0 | 1 | 1 |
| Agency social media | 0 | **0** | 0 | 0 | 0 |
| Newspaper | 0 | **0** | 0 | 0 | 0 |
| Social media/email others | 0 | **0** | 0 | 0 | 0 |
| **Total count** | **13** | **11** | **13** | **14** | **51** |

### The sensemaking loop

The sensemaking process was not as evident in the actions of the cyclone respondents as it was for the bushfire respondents, perhaps because the respondents seemed more knowledgable about and/or experienced with their disaster type and also because the path and progress of the cyclone was more predictable. For instance, respondents accepted that Airlie Beach was in the path of the cyclone from about two days out, that the winds would be intense before the eye came over them, and that the power would go out:

> *From there, after that* (the first intense winds of the storm) *it was just branches here and there, and once we got into the eye, I know you're*

*always told never to go outside sort of thing, but of course, we did, everyone on our street came out to have a look (ABM3).*

*So we knew roughly when we were going to get hit. We pretty much knew the power was going to go out, and then we were in the dark (ABF5).*

However, sensemaking did appear in several forms. The most prominent of these was the way radio was used once the power went out, and the information provided by other residents via radio station call-ins on what had happened in their own area. Five respondents, particularly those who were knowledgable about cyclones, appreciated this as it allowed them to picture the scope and extent of the storm and put it into the context of how their own lives would be affected.

*Yeah, I guess you could get first hand what the people in different areas, they way they were going, because you could pinpoint where they are in the community, I just know the area so well. So if the people in the top of Mackay are calling up and they are saying they've got 120 km per hour winds sitting there, then you can sort of just say, 'well, okay, it's starting to come in'. And if they eye was coming over us, we knew that we were on the southern end of the eye, then it was pretty big scope we are going to have. So we know we are going to be in for some winds for a long period of time and it was only travelling 18 kms, 20 kms an hour or something, so we knew that it was going to take an hour and a half, almost two hours to get across the top of us (ABM3).*

Those less experienced found radio call-ins by others in the community valuable in making them feel that they were not alone:

*I think it took your mind off what's going to happen next, and knowing that they're out there, there was help out there and people were listening and aware, you know, so my son would say we're at Strathdickie and this is what's happening. So it was good to know that people were aware (ABF4).*

The other aspect of sensemaking appeared during the eye of the storm – every respondent checked outside during the eye of the storm to see what damage the community had sustained:

*And then I think everyone got up in the eye because it went quiet, the kids even woke up and went, 'it's a bit quiet', and they wandered around and had a look, so the whole neighbourhood were out (ABF1).*

*…and then we did our walk around during the eye and I remember it was black after that (ABF3).*

*Well in the middle of the eye we went back out and we went out and nailed all the doors shut…I knew it would come back but I wasn't too concerned just to see what was down and what we could see, not that we could see much (ABM4).*

Some showed clear signs of sensemaking activity, when, on hearing of the cyclone, turned to more experienced people to determine what the cyclone might mean for them. ABF5, who was new to the area, telephoned her bother, who had lived in the area for 19 years to find out whether to be worried about the event. She then watched Austar to find out how to deal with the threat and also to get a grasp of the scope of the cyclone. ABF4 heard about the cyclone about three days out, but didn't register its significance until she spoke to some clients who were fisherman about what it meant for her town and sensemaking resulted in a realisation. Because she had the cyclone preparation booklet provided by the local council, she was able then to engage in a process of preparation that put her sensemaking activities on hold for a short time.

It was evident from the interviews at Airlie Beach that the sensemaking loop was an important part of a model that depicted cyclone information seeking activity.

**What people were looking for**

As in the bushfire interviews, the Airlie Beach participants wanted to know the path, intensity and time of arrival of the cyclone. Once the cyclone had passed through, finding out how friends, family and neighbours had fared was the priority, followed by when the power would be back on. In addition, restoration of other services, such as telephone, flights in and out of Airlie Beach, and re-opening of workplaces were mentioned by many respondents.

*What category was it going to be? Whether I needed to get batteries, store water. Whether it was going to die down, basically what type of cyclone it was (ABF5).*

*Just basic news mainly, what pressure it was, capacity, where it was, which way it was moving, how fast it was travelling…(ABM4).*

*So I could see the progress, I knew exactly what speed it was doing, I knew what the intensity was and I knew what to do about it…(ABM5).*

*Timeframe I suppose, the track in terms of north and south, and ETA and the strength and definitely the category (ABF1).*

After the cyclone had passed over, how the community had fared was important, as well as letting friends and family know they were safe.

*Yeah, what they've sustained, who needed emergency help and that sort of thing (ABM3).*

*I checked my neighbour's place and my sister-in-law was in the house next door and I had a look and made sure they were okay, and checked all the neighbours (ABM6).*

*Well, we knew for example, that Linda at Strathdickie had lost all her trees, that sort of information. …Yeah that was mainly what was going on and I mean we knew it had dissipated and gone inland, so we were just sort of, 'has anyone been hurt and does anyone need a feed' mode (ABM5).*

Access to electricity was something that all the respondents were concerned with after the cyclone passed, and where to get petrol and essentials such as water.

*We were flying out on Tuesday for a holiday, so we were mainly concerned about our flights out. Power was out for all of that time, so we were concerned with that too (ABF2).*

*…finding out where food was, and finding out where drink was, and picking people up who needed to go to the grocery store and trying to get guests onto flights because no-one could access anything (ABF3).*

*Not knowing when the electricity was going to come back on was the big issue, because you couldn't plan anything, you couldn't buy groceries…(ABF3).*

Data on what people were looking for and how many of the interviewees had looked for this type of information is contained in Table 4.21, below.

**Table 4.21 What people in a cyclone want to know**

| Information sought | Number |
|---|---|
| Track of the cyclone, category, wind speeds, crossing location | 7 |
| Damage information | 7 |
| How friends, family, neighbours and work had fared | 7 |
| Getting post-cyclone supplies and equipment | 6 |
| Checking on friends and family | 5 |
| Responding to concern of friends and family | 5 |
| When the power would be back on | 4 |
| When airport would be operating | 2 |

#### 4.3.2.11. Effect of cyclone interviews on the disaster information seeking model

The information distilled from the Airlie Beach cyclone interviews was applied to the disaster information seeking model that was developed in Chapter 2.

The alert sources were discovered to be radio, the Bureau of Meteorology (the Australian Government weather service) and other weather websites, other people and television news. Some of the factors affecting the sources that people selected were more varied than those evident in the bushfire interviews. These were found to be the extent of the person's locus of control (including self efficacy), previous cyclone experience or contact with people with experience, message frequency, message accuracy, message source (particularly availability, accessibility and availability of information via certain sources), resources, social ties, location and situation in relation to the cyclone and its severity. In addition, the number of possible source sequences was plotted and was also found to be more varied than in the bushfire. These source sequences and also the source preferences are represented in Figure 4.13, which is below. Also discovered during the interviews was the importance of time, which in the bushfires seemed to pass quickly and forced respondents to seek, receive, interpret and act quickly.

In the cyclone, the pressure of time was much less evident, and many of the experienced people seemed to treat it like any regular deadline. Experienced people decreased their information seeking activity as the cyclone drew closer and the inexperienced increased theirs. There was not the evidence of psychological distress that appeared several of the bushfire interviews. Here is an example of the effect of passing time on an experienced respondent:

> *So we sort of had six days to prepare ...I found it* (information seeking) *plateau'd, it sort of got to the point where we were sourcing as much information and everything we could probably five or six days out. And then within three days out we were actually looking at it less, we sort of started dropping off because you were looking and then the preparations, you've got to prepare for it (ABM3).*

In addition, the path of the cyclone was accurately predicted, and interview respondents lived in an area where the local council had distributed information on what to do to prepare for a cyclone. This resulted in respondents recounting a methodical pattern of preparation behaviour that was consistent across many of the respondents before the cyclone hit them on Saturday night:

> *Friday I was busy freezing blocks of ice in our freezer to make sure that we had enough ice and eskies. I was gathering blankets and pillows because we use the laundry under the house and then the whole day Saturday we were just clearing the yard. Basically removing dead trees and making sure all the batteries worked. I went into town to get any food I had missed (ABF5).*

This representation of time was consistent through all of the interviews, so like the bushfire information seeking model, time will be added illustrate the effect of time on the information seeking process. This is shown in Figure 4.13, below.

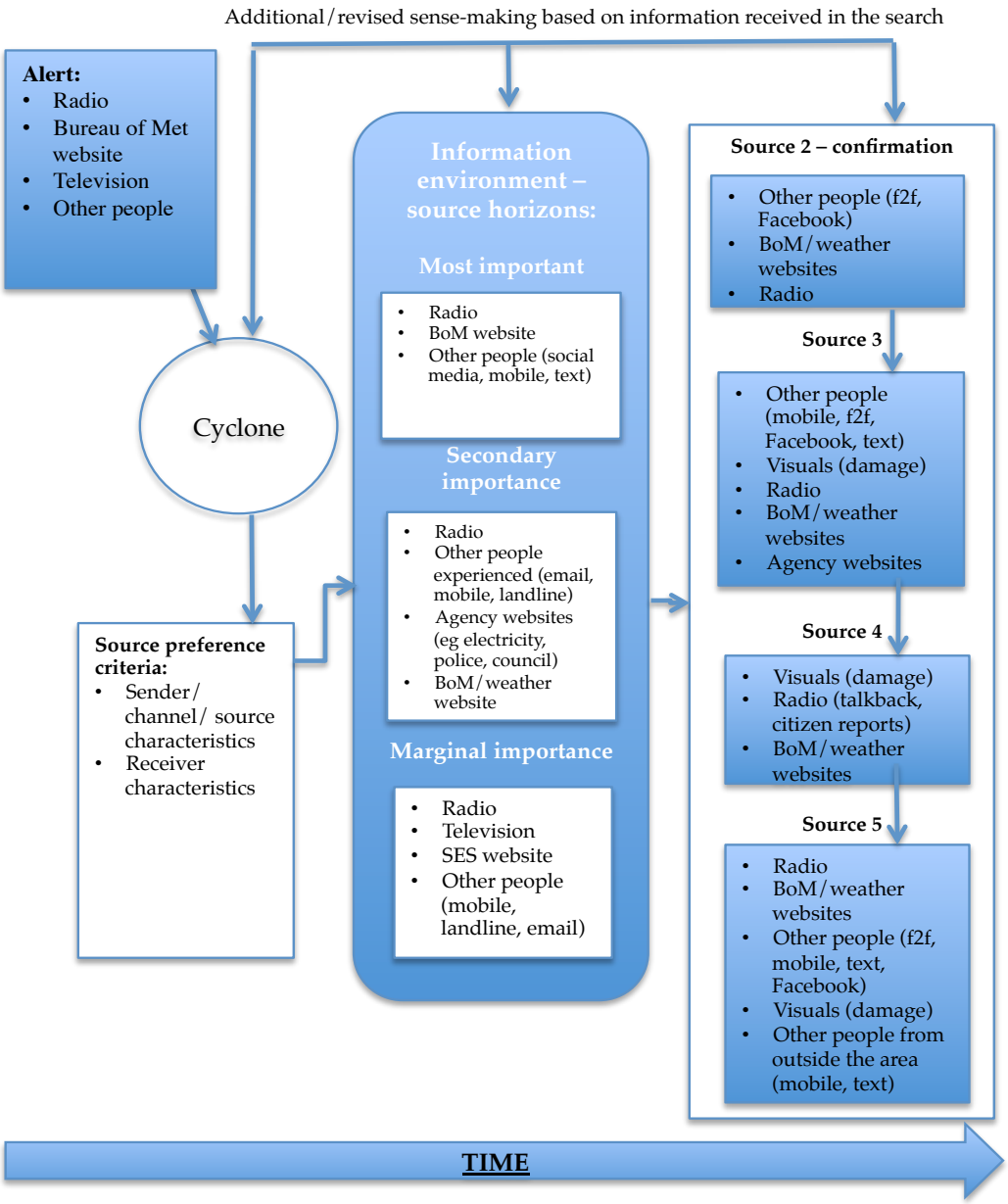



**Figure 4.13 The cyclone information seeking model developed from the interviews.**

Overall, the model is more complex, with more information seeking options taken up by the cyclone interview respondents as a group than the bushfire group, and a wider range of influences coming to bear on their information seeking choices. Here, the model appears to be more like Savolainen's, with a number of sources appearing in each zone of importance. For example, radio appears at each level of importance.

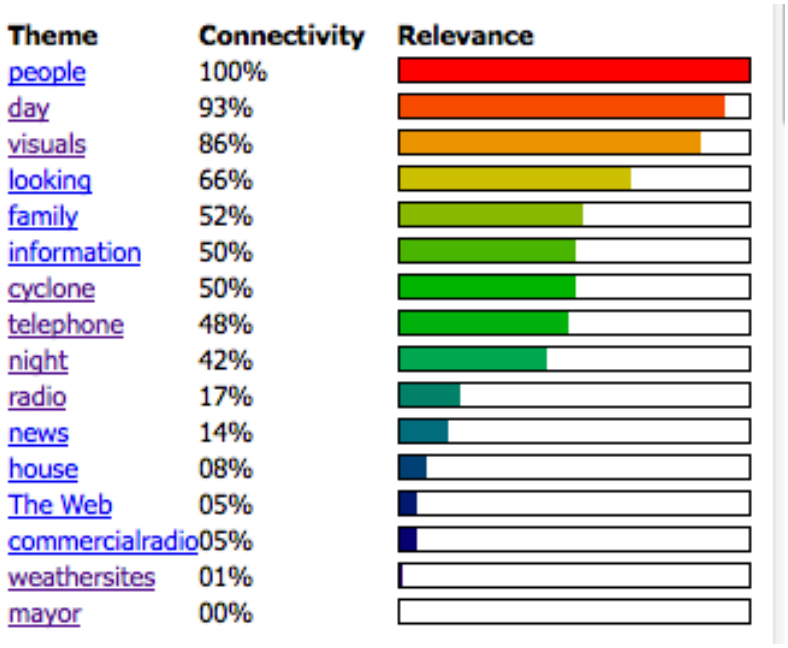
**Generation of the Leximancer concept map for cyclone**

The next step was to run the transcripts from the cyclone-affected area through Leximancer to see if there were any remaining insights into information seeking in a cyclone. The connectivity table described for the bushfire interviews was developed for cyclone and a concept map developed. Discussion of the themes that emerge from these will be presented, but first, the process of preparation for use of the software will be described.

**Preparation of the transcripts for use in Leximancer**

Cleaning the Airlie Beach cyclone interview data of semantically weak words followed a similar process to that undertaken to clean the Gerogery bushfire interview data. Occurrences of the words 'probably', 'everything', 'happened', 'things', 'stuff', 'saying', 'heard' and 'knew' were investigated for meaning, relevance and connectivity, and the weakest removed from the cyclone thesaurus. As with the bushfire interview data, words were considered weak if they were used for emphasis, or with no certain aim, or did not add to the aim of finding out how people sought information and what they sought. For example, "…probably two days before, at least…" (ABF1) and "So what happened was…", or "…the same sort of stuff like Austar…" (ABF5) and "…so people knew they could go there…" (ABM2). All of these words were removed from the thesaurus.

The resulting concept hierarchy is included below in Figure 4.14. Other people, the deadline-driven nature of the cyclone, and visual/environmental cues were key themes to emerge from manual coding and analysis of the data, and these were confirmed here. 'Looking ' and 'information' were key concepts that would be expected from an interview dealing with information seeking, but something that did emerge a little more strongly than was evident in the manual analysis was the importance of family – this may be because, being a Saturday on the day of the event, interviewees talked extensively about what individuals in their family were doing to help prepare. Also, given the drawn out nature of the event, many respondents described regular contact with family outside the district. 'Telephone', 'radio' and 'news' were also well explained in the manual analysis. In all, the Leximancer analysis produced no new insights into information seeking in Cyclone Ului.



| Theme | Connectivity | Relevance |
|---|---|---|
| people | 100% | |
| day | 93% | |
| visuals | 86% | |
| looking | 66% | |
| family | 52% | |
| information | 50% | |
| cyclone | 50% | |
| telephone | 48% | |
| night | 42% | |
| radio | 17% | |
| news | 14% | |
| house | 08% | |
| The Web | 05% | |
| commercialradio | 05% | |
| weathersites | 01% | |
| mayor | 00% | |

**Figure 4.14** **Cyclone interviews concept hierarchy generated from Leximancer**

The concept map generated for the cyclone interviews (below in Figure 4.15.) shows two main clusters joined by the theme 'looking'. To the centre right of the map were four of the top five themes, 'people', 'day', 'visuals' and 'family', which were joined to 'information' and the range of media sources of information by the theme 'looking'.

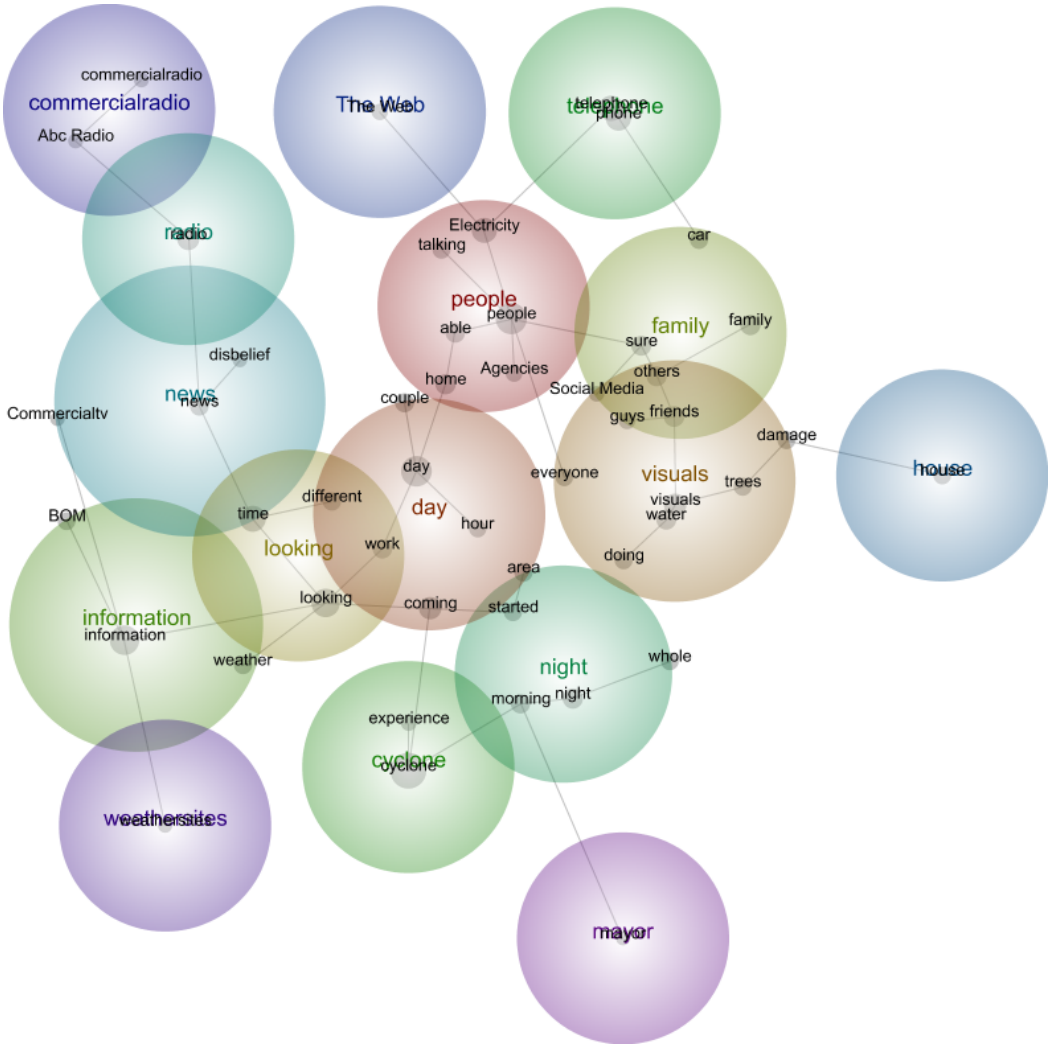



**Figure 4.15 Cyclone concept map generated from Leximancer**

This map shows the importance of the time concepts, 'day' and 'night', as well as the sources 'people' and the means of interpersonal connection ('telephone'), environmental cues ('visuals'), weather websites and media. Geographically concentrated concepts – people, their families, the effect on time on the individuals, and the environmental cues collected from their immediate situation – emerged as the most inter-connected cluster, and this reflected the manual analysis in which other people, their activity during each day and environmental cues were key to information seeking patterns. Overall, the Leximancer analysis confirmed the emphasis of the manual analysis, particularly regarding the information sources used and the connection with time. The Leximancer analysis showed that the manual analysis had not overlooked any important concepts or relationships and this resulted in no changes being made to the first model for cyclone information seeking, presented previously in Figure 4.10.

**Cyclone interviews – a summary of their impact on this research**

The aims of the interviews and their analysis was to discover information seeking patterns and compare these against the original model, to determine if the disaster information seeking model was a reasonable framework for research in this field, and to present and to provide guidance in the development of a survey instrument for later use. The cyclone interviews established a number of information seeking pathways and behaviour patterns for this disaster type that all sit comfortably within the disaster information seeking model. From the cyclone perspective, it seemed that the disaster information seeking model could be an effective framework for exploration of information seeking activity in this type of disaster. In addition, the interviews provided ideas for a number of questions and possible answers for a series of closed ended questions in a survey, including a list of possible sources that were not evident from the literature review. The most important of these were the importance of other people and the need for differentiation between weather websites and news website

### *4.3.3. The overall picture presented by the interviews*

The interviews provided a valuable illustration of information seeking behaviour in four Australian communities. A clear pattern could be seen within each interview, including the source of the first alert, where they went for confirmation information and what became their most important sources of information. The number of sources used by each respondent was also a factor emerging from the interviews, with differences shown between disaster types. The interviews also provided a valuable list of possible answers for closed questions about sources and information behaviour.

Differences emerged between disaster types. The number and type of information sources were different, as well as combinations of sources that people used. The interviews also showed a difference in the levels of the use of the web between the smaller and larger communities that was then explored in the survey. Time pressures seemed to have some impact on the number of sources people used – in a compressed, high pressure situation such as the bushfire and the flash flood, people in the affected community relied on a few trusted sources. The flash flood community started out this way, but being unable to get information that gave them the whole picture, respondents then widened their search before establishing a steady search pattern with a small

number of the most informative sources. In the slow flood and cyclone, where people had early warning and plenty of time to consider scenarios, their number of information sources was greater – 4.85 for the slow flood and 5.38 for the cyclone.

Generally, the Leximancer concept maps supported the initial manual analysis, but did add a new dimension to the connections between themes. All of the maps showed the emphasis of other people in the information seeking process and it was important for the later survey to explore this concept in more detail. The interviews showed that mobile phone and landline were important means of connecting with others, but it would be useful to break this down further in the later survey to see if voice or text was more popular, and in what situations. The interview analysis also did not explore in any detail the use of email or social media to secure information from other people, although the analysis did attempt to find out if agency social media was a source of any significance. The survey will ask questions about the use of social media as a conduit to information imparted by other people, as well as sourcing information from agencies.

Environmental cues in different forms were also an important component in each disaster type analysis, although in St George, the importance of visuals was part of the theme 'flood'. This had implications for survey questions on the type of information people sought and the media people selected if visual forms were preferred. In St George and Airlie Beach, actively having a look was a significant part of a methodical information seeking process, whereas in Gerogery during the bushfire, the smoke and fire were visual clues that were absorbed as respondents did other things in reaction to the fire. In Toowoomba, respondents did not actively seek visual cues by going to the scene, but they did receive greater understanding of the situation by the visual cues of email and television. This was illustrated in the concept maps by the overlapping link of the Gerogery 'visuals' theme to 'time', while the visuals themes in the St George and Airlie Beach maps were much more tightly linked to 'others' and 'people'. In Toowoomba, 'visuals' slightly overlapped 'others', but also touched on 'time'. This pointed to the need for an investigation into the urgency of information seeking – in the faster moving disasters, the bushfire and flash flood, time was a significant concept (hours, minutes), more-so than the slow moving ones such as cyclone and slow flood, where time emerged as the concepts 'day' and/or

'night'. In the bushfire interviews, time related to the progress of the fire and activity around this progress, whereas the interviews on the flash flood showed that time related more to the information seeking process.

'Work' was an unexpected emergent theme in all of the maps but Gerogery, where it appeared as a concept of reasonable relevance to all of the other concepts (19%). It seemed that work networks were not only an important part of the initial alert, but also contributed to the types of information people looked for, as many included work in their post-disaster information seeking.

Only the interviews from the Airlie Beach cyclone and the St George slow flood featured a substantial amount of official information, much of this received from the Bureau of Meteorology. Both disasters were slow moving, potentially giving people time to seek out more sources, although there was not a great deal of difference between the sources used in these two incidents (Airlie Beach 4.85 sources and St George 5.38 sources) and the number used in the flash flood at Toowoomba (4.85). This contrasted with the number used at the Gerogery bushfire (2.62). The difference between the fast moving disasters, the bushfire and flash flood might relate to the efficacy of the information sources used – at Gerogery, people used the same sources for the duration of the incident, whereas Toowoomba people added new sources to their search and deleted others as time went by. The Gerogery people were not looking for 'what was happening' information, as the Toowoomba respondents were for the first day, but they were looking for specific locational information, which was not key in the Toowoomba respondents' searches. These factors confirmed differences between disaster types, so it was important to determine in the survey the type of disaster the respondents were using as their point of reference to answer questions.

Images, sent by friends and appearing on television and in social media, were discovered in the flash flood interviews to be very important to the sensemaking process. Images were beneficial in the slow flood (a map of the areas expected to be inundated at the expected flood peak) and the cyclone (the map of the path of the cyclone presented by BOM and other weather organisations). For this reason, images will be added to the list of message/source features that Mileti et al. developed as part of the risk communication for natural hazards model.

### *4.3.4. What people were looking for*

The types of information people sought was similar across disaster types. Information about the event, where it was and when it would peak/hit/reach the interviewees was the most prevalent in bushfire, cyclone and slow flood, with the scope of the disaster the focus for the flash flood respondents. In both cases, this was followed by or integrated with information about the safety of family and friends. However, other themes emerged within this category including location of safe places, road closures, how workplaces fared, when the power would be back on, when other places would peak (in the case of a flood). Table 4.22 summarises the information that people were seeking for each disaster.

**Table 4.22 What people were looking for**

| Disaster type | Information sought | Number |
|---|---|---|
| **Bushfire** | Where the fire was and where it was going | 9 |
| | Whether family and friends were OK | 7 |
| | What to do/how will it affect me? | 3 |
| | Where there was somewhere safe to evacuate to | 1 |
| | Road closures | 1 |
| **Cyclone** | Track of the cyclone, category, wind speeds, crossing location | 7 |
| | Damage information | 7 |
| | How friends, family, neighbours and work had fared | 7 |
| | Getting post-cyclone supplies and equipment | 6 |
| | Checking on friends and family | 5 |
| | Responding to concern of friends and family | 5 |
| | When the power would be back on | 4 |
| | When airport would be operating | 2 |
| **Slow flood** | How will the flood affect own property | 13 |
| | Flood peak information | 12 |
| | Learn more about previous flood experience of others | 8 |
| | How others fared | 4 |
| | What agencies were doing | 3 |
| | Evacuation information | 2 |

| Disaster type | Information sought | Number |
|---|---|---|
| | What to do to prepare | 2 |
| | How the workplace would fare | 2 |
| | Whether a rumour was true/false | 2 |
| | Road closures and routes for travel | 1 |
| | When electricity would be back on | 1 |
| **Flash flood** | What happened | 14 |
| | Whether family and friends were OK | 7 |
| | Road closure information | 4 |
| | What to do? | 2 |
| | Weather/where will water go? | 2 |

Themes that emerged in common in each of the interview communities were the welfare of friends, neighbours and family, the path and timing of the disaster phenomenon, and the personal effect of the disaster. Welfare of friends and family could be checked using disaster location and pathway information, so this was also a recurring theme.

## 4.4. Implications of the interviews for the disaster information seeking model

The interviews conducted across the four locations provided information that supported the disaster information seeking model in many ways, but also revealed a number of shortcomings that could be accounted for by making changes to the model or the type of research used to test the model. In an effort to show areas of strengths and weakness in the disaster information seeking model developed in Chapter 2, versions of the model were developed for each disaster type using the contextual information presented by the interview respondents. This information allowed the model to be mapped for specific communities and also allowed connections between components to be visualised and considered.

### *4.4.1. The alert*

The first alert was shown to come from a small number of information sources in all of the disasters studied (fire: 3, cyclone: 4, slow flood: 6, flash flood: 4). This concentration of alert sources might point to a relationship between the type of disaster and the information source that delivered the first alert. The interviews

also confirmed the importance of the first alert sitting outside the information seeking circuit that is shown in the model, as it was an unprompted input rather than sought-after information.

### *4.4.2. The disaster type*

Because of the possibility of a relationship between the first alert source and the type of disaster, the interviews showed the importance of retaining this component of the model and identifying in later research characteristics of disasters that might have some effect on the alert source and the information seeking behaviour to follow.

### *4.4.3. Source preference criteria*

At the outset of the interviews, it was expected that the complexity of the source preference criteria might drag the focus of the research from finding out how people sought information to why they sought information. For this reason, questions were not asked about the factors that led respondents to certain sources – it was decided to draw this out of the explanations they provided of the information seeking process itself. Some factors, like locus of control and cognitive abilities, would be outside their understanding and would need a special set of extra questions that would explore aspects of their psychology to determine their position within each of these influencing factors.

The interviews revealed two additional influences on information seeking: time and the availability of images. Images will be included in the source preference criteria list developed at the end of Chapter 2. Time related to the times that certain media was available but was also related to other aspects of the disaster and the information seeking process (such as how long people spent looking, how much time they had until the disaster arrived), so it should not be confined to the source preference criteria. As a source preference criteria, it is addressed by media availability – the other aspects of time in relation to the model will be addressed in section 4.4.7.

A significant point that emerged from the interviews was that the term 'source preference criteria' indicated some conscious use of the influencing factors, whereas the interviews showed clearly that the sources were chosen according to media habits or for an unconscious reason, such as trust in the source or the

availability of the information. This indicated that the term used to describe this section, source preference criteria, was not exact as it inferred conscious selection. The language used throughout this chapter in the explanation of the interviews reflected that the source preference criteria were actually factors influencing source selection, so these factors will be grouped as 'Influences on source selection' from this point onward.

### *4.4.4. Source horizons*

The interviews successfully determined the most important sources, secondary sources and marginal sources for each interviewee. The information contained in the "most important source" horizon will be of value to Australian disaster communication practitioners, and was easy to measure in the interviews. However, many of the sources appeared in each of the horizons because the participants were clustered in terms of disaster type, not their preferred information source. This may point to the necessity at a later stage to identify why a certain information source appears in the most important source horizon for one person and the marginal source horizon for another within the same disaster type. Research outside the scope of this project, but which incorporates a deeper investigation of influences on source selection, might solve this problem. In addition, the interviews helped develop a sound list of sources that could be used in a survey. All of the interviews showed that other people needed to be refined into a number of different groups – other people via face-to-face, phone or text; other people email or social media; and agency contacts. 'The internet', which is how most studies treated any online activity, was clearly divided between weather websites, news websites and agency websites, all with a very different information type. The St George and Toowoomba floods also showed that it was important to differentiate local media from statewide or national services, as local media was preferred for its specific information. These were important points for development of the survey instrument.

### *4.4.5. Source sequences*

This section of the model was useful in establishing a sequence of sources for each disaster type. However, it was here and in the source horizons that the practice of classifying sources and forms (or form) in the one group could become problematic for practitioners looking for guidance from research results based on this model. For instance, radio appears in four of the five steps of the

sequence for slow flood (including the alert), but in the interviews, respondents referred to different programs (for example, news, David Iliffe's program), presenters and sometimes even radio stations across the period of the disaster. However, it will be difficult in a survey to identify every possible source and achieve simplicity at the same time, so the general classification of sources and forms will continue to be used for the survey for this study.

### *4.4.6. Feedback loop*

The feedback loop in the disaster information seeking model was demonstrated to be an important element, particularly where "other people" were an important or frequently used source. Each of the disaster types revealed information pathways that represented more of a looping activity than a linear activity. Respondents reported that other people were a regularly used source, and that information they provided was often confirmed by other sources, or they were used to contextualise new information, particularly in the case of the longer time-frame disasters such as cyclone and slow flood. This occurred when experienced residents were consulted about information that others received from another source such as a weather website. This looping pattern also reflected changes in the type of information sought, which also reflects the passage of time and the progress of the disaster. The disaster type should stay in the feedback loop, because of the stage the disaster is at and the features of the disaster at that moment affected the way people looked for information and the type of information they looked for. For example, in the lead up to the cyclone, weather websites, other people, radio and television were used, but during the eye of the storm, respondents reported that environmental cues were their main source as they went outside to check for damage.

### *4.4.7. The addition of time*

All of the interview groups referred to time in such a significant way that it was evident that time should be a factor in any depiction of the passage of an individual through the information seeking process. The temporal aspect of information seeking was not explored in the literature review, but the literature does show its importance in the information seeking process. Savolainen described time as one of the main contextual factors of information seeking (2006, p. 110) saying that in most cases, time was a scarce resource for information seekers. Temporal constraints can restrict the set of information sources a seeker use, source preference and source accessibility, which can include ease of use

(Savolainen 2006) or the availability of a source at a certain time such as a news bulletin on television. This influence of a time on many aspects of the disaster information seeking process supports its inclusion in the model.

The final version of the model after the input of the interviews is presented in Figure 4.16.

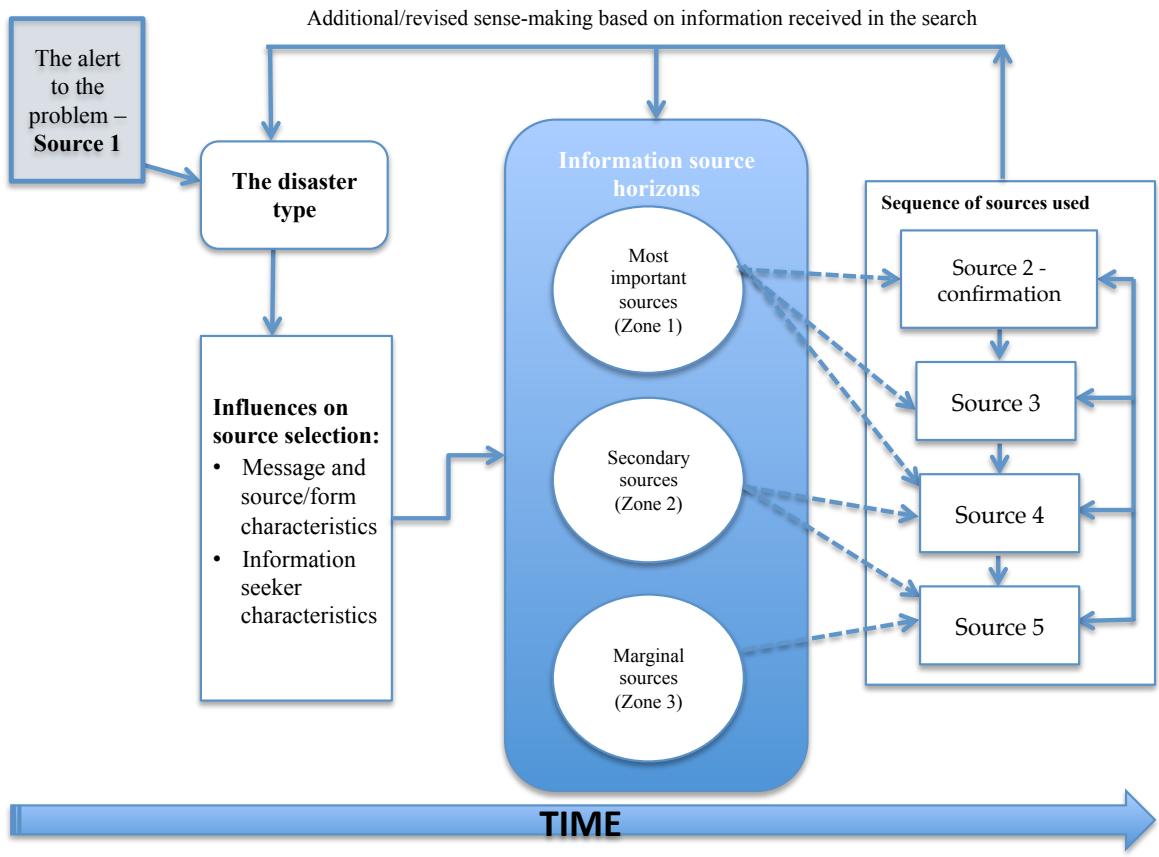



**Figure 4.16** **The disaster information seeking model after consideration of interview data**

## 4.5. Summary of phase one: the semi-structured interviews

This chapter reported results of 51 interviews conducted in four different Australian communities that had experienced different disasters. The knowledge taken from the literature review was used to develop the interview questions, and the results of the interviews were used to develop the survey instrument.

The aims of this phase of the research were to discover issues and information seeking behaviour, review the first iteration of the disaster information seeking model against this behaviour, and to reveal information that could be used to develop a survey instrument. Key findings of this chapter that provided useful new information for development of the survey instrument were:

- establishment of a comprehensive set of information sources for use in closed questions;
- refinement of a number of these sources, such as separating the Bureau of Meteorology from other weather websites;
- separating personal social media contacts from agency social media sites; and refining the group 'others';
- the emergence of the questions about the size of the community and the relationships to web use and use of personal contacts within an agency or local council;
- the differences between the type of disaster and information seeking pathways of individuals; and
- a pointer to the speed of a disaster having some influence on the number of sources, and the information seeking pathway options that were used by each interviewee.

The key findings of the chapter that related to the proposed disaster information seeking model (which was first presented in Chapter 2) were:

- the alert is an important factor of the model and is well placed outside the information seeking loop that is explained in the remainder of the model;
- disaster type has some effect on both the alert and information seeking behaviour, and as such should remain a separate element within the model;
- source preference criteria became 'influences on source selection' after consideration of the interview data;
- influences on source selection is an element that seems to have great importance in determining why people undertake certain disaster information seeking behaviour, and is used and revisited many times during the information seeking process. However, exploration of this component of the model in this study threatens to make this study unwieldy – therefore the study will retain its focus on the 'what' and 'how' of information seeking behaviour. The influences should be

explored in depth once patterns have been established in the behaviour itself;

- images were added as a factor to the influences on source selection list;
- source horizons and source sequences could include both sources and forms, and until recently in most research, the two have been interchangeable. These differences should be explored, but threaten to make a survey complicated and hard to analyse if all the different possible sources and forms were identified; and
- time is presented as an influencing factor: because it can influence information seeking and also measures the progress of the approaching disaster, it will appear outside the influences on source selection and will have more of an influence on every component of the model, not just the selection of sources.

The aims of this stage of the research were to undertake a process of discovery, review the fit of the disaster information seeking model in a variety of disaster information seeking contexts, and develop a bank of information for development of a survey instrument. The interviews have provided rich material that has aided development of a model that will be useful for practitioners in number of ways. The research has shown a clear difference in disaster behaviour and information seeking across disaster types, indicating that communication strategies should be developed for specific disasters. In addition, the background characteristics of both the agencies involved and their communities combine with characteristics of the sources and forms to influence disaster information seeking, and these should also be taken into account when planning communication with a community. Information seeking has also been shown to be a circular, integrated process rather than a linear one, so multiple, consistent messages from multiple sources and using many forms is important. In addition, the interviews have provided a store of closed ended question selections for the survey that can be added to the information provided in the literature review stage.

The next section, Chapter 5 will detail the survey implementation and will explain the results, profiling the respondents and analysing the data they provided. Chapter 5 will also review the proposed disaster information seeking model in light of the findings of the survey, refining the model ready for a validation focus group, to be explained in Chapter 6.

# 5. Phase two: survey study

The interview study that was detailed in the previous chapter explored a number of concepts that influenced the design of the disaster information seeking model, and subsequently, a survey instrument (see Appendix 7). This chapter will explain the implementation and results of the survey, which was conducted in 2013. It will report the results in terms of the respondents' profiles, their disaster experience, and their information seeking behaviour. This information will be used to make further adjustments to the disaster information seeking model. The information seeking pathways established in the interviews for each disaster type will be compared with the data collected in the survey. Figure 5.1 on the next page illustrates the structure of this chapter.

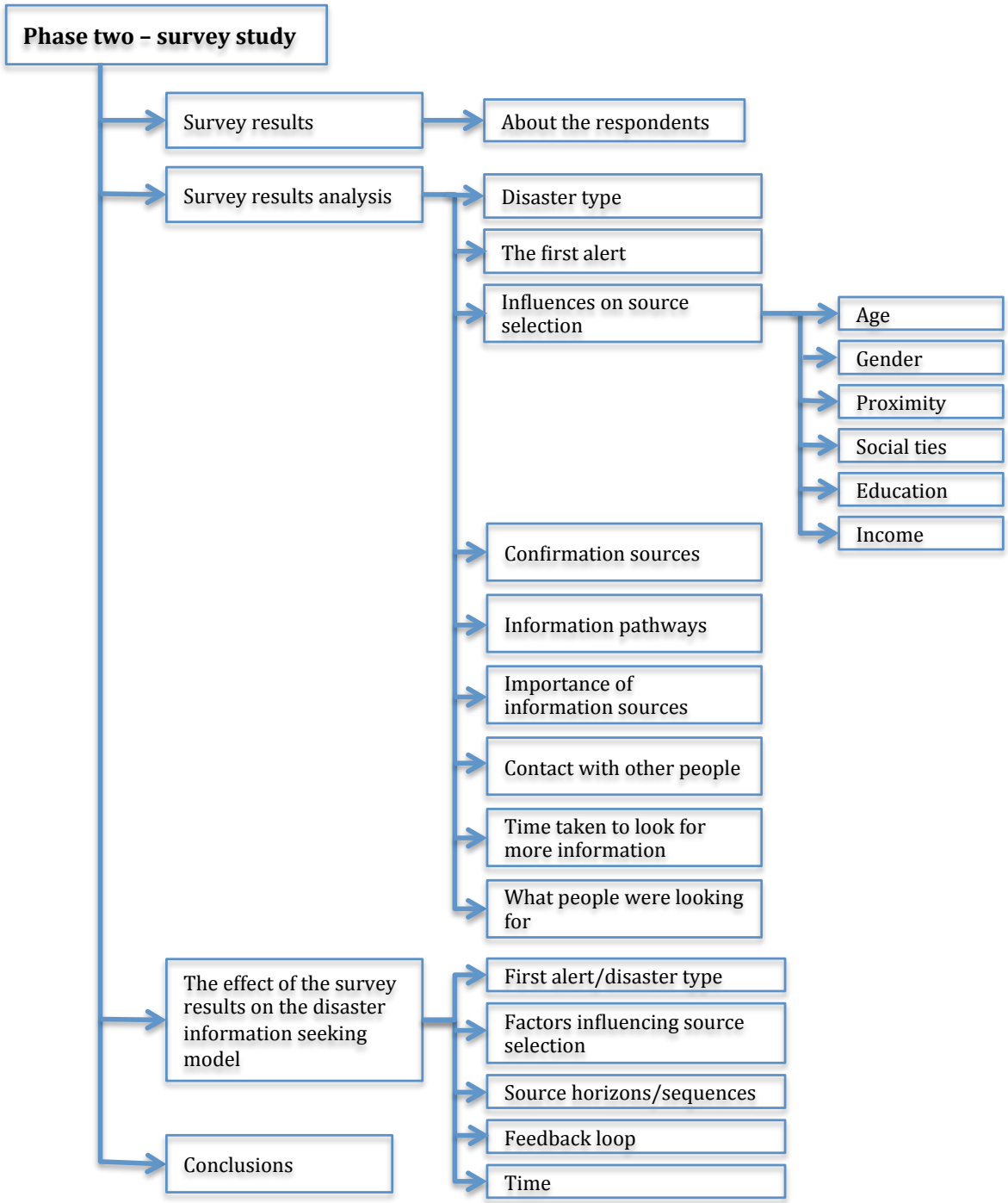



**Figure 5.1 A map of Chapter 5 Phase Two: survey**

## 5.1. The aim of the survey

The survey aimed to explore information seeking behaviour in order to make further adjustments to the disaster information seeking model developed in Chapter 2 and refined in Chapter 4. Instead of testing the model, this survey investigated the legitimacy of the model's components, and what form the information seeking activity took across all types of disasters by establishing

which specific information seeking behaviour patterns were undertaken by respondents. This included information seeking behaviour for disasters not considered in the interview phase, including storm, mudslide, tornado, tsunami and earthquake, as an aim of the survey was to establish possible information seeking pathways not mentioned in the interviews. In doing this, it contributed to answering the research questions of this thesis, which are:

*How do people look for information during the impact phase of an emergency?*

1. *Can information models, which are well established theory, be used to describe how people look for information during the impact phase of a disaster?*
2. *What information seeking patterns emerge from the impact phase of a disaster?*
3. *Can this knowledge extend known information theory and guide emergency agencies, as strategy as practice?*

The model, which is shown in Figure 5.2, was revised after analysis of the interview data in Chapter 4. It was similar to the original iteration presented in Chapter 2, but with the addition of time as an important reference, and the change of terminology in the section indicating factors that might influence the selection of sources and forms from 'source preference criteria' to 'influences on source selection'. This chapter will investigate each component of the model against the data collected in the survey.

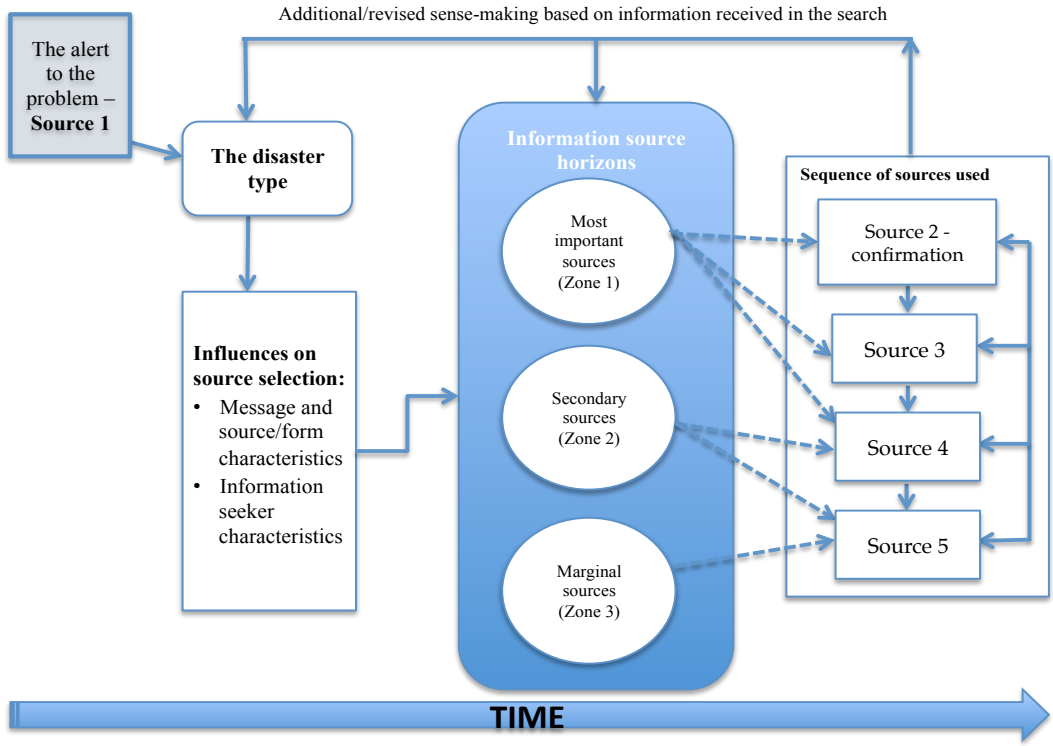



**Figure 5.2 The disaster information seeking model as it appears after consideration of interview data**

## 5.2. Survey results

From the online survey, 277 responses were received. A total of 272 were viable for analysis for this thesis, where respondents answered the key questions from Question 12 onward, which asked about disaster type and information seeking behaviour. The response rate could have been as high as 43%, based on contact numbers of 644 and the number of responses. The response rate for the hard copy version was 3.7% (n=71) and three of these were not viable responses for this project. The total number of usable responses for this analysis was 340. Because the aim of the survey was to discover a range of information behaviour patterns rather than test hypotheses and make generalisations about human behaviour, the data will be analysed descriptively.

### *5.2.1. About the respondents*

Table 5.1 provides the details of who the respondents were and the disaster type they experienced that puts their responses into some context. The demographic profile of respondents was skewed toward females (70.7%), people aged 40-55

(39.4%), those with a university education (56.1%) and higher incomes (32.9% earning more than $100,000), and living in a city (53.2%). Respondents were also more likely to have experienced a flash flood (48.8% of disaster experienced respondents) or slow flood (20.3%) than any other disaster, which might be a result of the survey originating in Queensland, Australia, a state in which almost every local government area had experienced some flooding in the two years before the survey was conducted. Included in the table are the Australian population equivalents.

**Table 5.1 Profile of respondents compared with the Australian population**

| | | Sample | | Australian population |
|---|---|---|---|---|
| | | N | % | |
| **What is your gender?** | Female | 244 | 70.7 | 50.6 % |
| | Male | 101 | 29.3 | 49.4% |
| | Total | 345 | 100.0 | 100% |
| **Which category below includes your age?** | Younger than 25 | 21 | 6.1 | 13.3% |
| | 25-39 | 68 | 19.7 | 20.9% |
| | 40-55 | 136 | 39.4 | 20.9% |
| | 56-70 | 89 | 25.8 | 14.9% |
| | 71+ | 31 | 9.0 | 9.7% |
| | Total | 345 | 100.0 | 100% |
| **What country do you live in?** | Australia | 292 | 83.9 | |
| | Other | 56 | 16.1 | |
| | Total | 348 | 100.0 | |
| **What is your partnership status?** | Married or in a partnership | 239 | 69.3 | 58.7% |
| | Single or divorced | 106 | 30.7 | 41.3% |
| | Total | 345 | 100.0 | 100% |
| **How many people currently live in your household?** | 1 | 58 | 16.8 | 24.3% |
| | 2 | 147 | 42.6 | 34.0% |
| | 3-4 | 110 | 31.9 | 31.7% |
| | 5 or more | 30 | 8.7 | 10.0% |
| | Total | 345 | 100.0 | 100% |
| **How many of these are dependents (children, elderly or disabled)? *** | None | 221 | 65.2 | |
| | 1-2 | 93 | 27.4 | |
| | 3-4 | 23 | 6.8 | |
| | 5 or more | 2 | 0.6 | |
| | Total | 339 | 100.0 | |
| **What is the highest level of education you have completed?**** | Primary school | 23 | 6.7 | 5.2% |
| | High/secondary school | 64 | 18.6 | 58.5% |
| | Vocational or trade college | 64 | 18.6 | 14.6% |
| | College/university | 193 | 56.1 | 21.7% |

| | | Sample | | Australian population |
|---|---|---|---|---|
| | Total | 344 | 100.0 | |
| **What is your approximate average yearly household income?** | $0-$30,000 | 48 | 14.8 | Median household income of $64,168 |
| | $31,000 - $80,000 | 102 | 31.4 | |
| | $80,000 - $100,000 | 68 | 20.9 | |
| | More than $100,000 | 107 | 32.9 | |
| | Total | 325 | 100.0 | |
| **What type of community do you live in?*** ** | City or suburb | 181 | 53.2 | 89.3% |
| | A regional town or semi-rural area | 105 | 30.9 | 4.55% |
| | A rural area | 54 | 15.9 | 5.52% |
| | Total | 340 | 100.0 | 100% |
| **Has your community experienced a disaster in the past two years?** | Yes, one disaster | 182 | 53.5 | |
| | No | 158 | 46.5 | |
| | Total | 340 | 100.0 | |
| **What was the most recent disaster your community has experienced?** | Sudden storm | 6 | 2.8 | |
| | Earthquake | 3 | 1.4 | |
| | Wildfire or bushfire | 24 | 11.1 | |
| | Cyclone/hurricane /typhoon | 35 | 16.1 | |
| | Tornado | 2 | 0.9 | |
| | Flash flood | 102 | 47.0 | |
| | Slow flood | 42 | 19.4 | |
| | Tsunami | 2 | 0.9 | |
| | Mudslide | 1 | 0.5 | |
| | Total | 217 | 100.0 | |
| **Were you asked or ordered by agencies to evacuate your home or workplace?** | Yes | 26 | 12.1 | |
| | No | 188 | 87.9 | |
| | Total | 214 | 100.0 | |

* Australian Bureau of Statistics does not measure total dependents, just dependent children; number of disabled dependents may also include disabled children.
** (Australian Bureau of Statistics 2011)
*** (Hugo 2012)

Table 5.1, above, also shows why more respondents appear in some of the demographic categories than others. For instance, all 348 respondents were shown to have answered the question 'What country to you live in?', whereas 345 people answered the question about gender. Disaster types appeared in the survey other than the floods, bushfire and cyclone that featured in Chapter 4, and these will be valuable for establishing at least a few sample information seeking patterns for these disaster types. These patterns can then be compared with the disaster information seeking model.

The following tables provide an understanding of the profile of the survey respondents. Table 5.2, below, breaks down the gender of respondents into their age groups, and also shows the percentage of each gender per age group. The subsequent tables, Table 5.3 and Table 5.4, show characteristics of the survey sample such as household composition, education and income.

**Table 5.2 Cross-section of gender and age or respondents**

| Age | Younger than 25 | | 25-39 | | 40-55 | | 56-70 | | 71+ | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | %* | N | % * | N | %* | N | % * | N | % * | N | % * |
| **Female** | 18 | 7.4 | 47 | 19.3 | 91 | 37.3 | 64 | 26.2 | 24 | 9.8 | 244 | 100 |
| **Male** | 3 | 3.0 | 21 | 20.8 | 45 | 44.6 | 25 | 24.8 | 7 | 6.9 | 101 | 100 |
| **Total** | **21** | **6.1** | **68** | **19.7** | **136** | **39.4** | **89** | **25.8** | **31** | **9.0** | **345** | **100** |

* Percentage of total for that gender or row

**Table 5.3 Household characteristics**

| | Number of dependents | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | None | | 1-2 | | 3-4 | | 5 or more | | Total | |
| **Household size** | N | % * | N | %* | N | %* | N | %* | N | % * |
| **2** | 127 | 87.6 | 18 | 12.4 | 0 | 0.0 | 0 | 0.0 | 145 | 100 |
| **3-4** | 34 | 30.9 | 71 | 64.5 | 5 | 4.5 | 0 | 0.0 | 110 | 100 |
| **5+** | 6 | 20.0 | 4 | 13.3 | 18 | 60.0 | 2 | 6.7 | 30 | 100 |
| **Total** | **221** | **65.2** | **93** | **27.4** | **23** | **6.8** | **2** | **0.6** | **339** | **100** |

* Percentage of total for that household size or row.

**Table 5.4 Income compared with education of respondents**

| | Average yearly household income | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $0-$30,000 | | $31,000 - $80,000 | | $80,000 - $100,000 | | More than $100,000 | | Total | |
| **Highest level of education** | N | % * | N | % * | N | % * | N | % * | N | % * |
| **Primary school** | 9 | 47.4 | 6 | 31.6 | 1 | 5.3 | 3 | 15.8 | 19 | 100 |
| **High/second ary school** | 14 | 22.6 | 21 | 33.9 | 12 | 19.4 | 15 | 24.2 | 62 | 100 |
| **Vocational or trade college** | 6 | 9.8 | 20 | 32.8 | 13 | 21.3 | 22 | 36.1 | 61 | 100 |
| **College/ university** | 18 | 9.9 | 55 | 30.2 | 42 | 23.1 | 67 | 36.8 | 182 | 100 |
| **Total** | **47** | **14.5** | **102** | **31.5** | **68** | **21.0** | **107** | **33.0** | **324** | **100** |

* Percentage of total for that education level or row.

The profile of the respondents showed a good spread across genders, ages, education levels and household characteristics, and this spread supported of a number of different information seeking behaviours. During the analysis of this data, these information seeking patterns will be drawn out and described, ready for comparisons with the disaster information seeking model. In addition, the characteristics of information seekers that could be included in the survey, such as age, gender, household, education and income, will be explored. These will be examined to confirm or refute the legitimacy of their inclusion in the model as 'influences on source selection'.

### *5.2.2. Item response*

Item response was consistently good in the online survey and the first stages of the mail survey, but item non-response increased when it got to the information behaviour section of the mail survey. The following table, Table 5.5, shows the item non-response. In the online survey (n=277), five people started and did not continue after Question 2 – If you live in Australia, what is your postcode? In the mail survey, two people discontinued the survey at Question 16 about most important sources.

**Table 5.5 Item non-response rates**

| Item | Online survey (n=272) | Mail survey (n=68) |
|---|---|---|
| Question 7 - dependents | 5 | 1 |
| Question 8 – education levels | - | 1 |
| Question 9 - income | 15 | 3 |
| Question 10 – type of community | 1 | - |
| Question 11 – disaster experience | 1 | - |
| Question 12 – disaster type | 2 | 3 |
| Question 13 – evacuation | 4 | 4 |
| Question 14 – first alert | - | 13 |
| Question 15 – confirmation | - | 10 |
| Question 17 – method of contact with family and friends | - | 6 |
| Question 19 – what people were looking for | - | 12 |
| Question 21 – how friends and family inside a disaster zone were contacted | - | 2 |

## 5.3. Survey results analysis

This survey (see Appendix 7) explores information seeking behaviour. The outcome of the analysis will allow further adjustments to the disaster information seeking model developed in Chapter 2 and then extended in Chapter 4. For this reason, the analysis will firstly look at who the respondents were, and then will follow the structure of information seeking process described by the model to describe the results of the survey: disaster type, first alert, confirmation source, information pathways, and importance of sources. The influences on source selection, which appear early in the model, will be considered at the end of the information behaviour analysis so as not to interrupt the analysis of the information seeking cycle described in the model. The influences on source selection is a large section with complex content, which could interrupt the flow of the information behaviour analysis if included between the alert and the source horizons. Following the influences on source selection analysis, analysis of respondents' contact with family and close acquaintances, the time they took

from hearing about the disaster to look for more information, and what people were looking for will be completed.

The survey investigated what form information seeking activity takes and what factors might influence this activity. Because of this approach, descriptive methods, or qualitative analysis, will be most often used to analyse the data for two reasons: the analysis of the data was not required to test hypotheses; and the data was collected to illustrate information seeking behaviour patterns that could contribute knowledge to the model. The data was not collected to provide statistical information that could be used to test the model, but it may provide early leads on the potential influence of some factors on how people select their sources and forms. Testing of the model will be an important step that should occur after this study.

The method of analysis used to plot these information seeking behaviours from the survey data is called 'qualitisation' (Tashakkori & Teddlie 1998). This is the action of drawing narratives, traditionally the domain of qualitative data analysis, from quantitative data. Tashakkori and Teddlie described five kinds of narrative or qualitative profiling: modal, average, comparative, normative and holistic. The profile types can overlap in some applications of the analysis techniques. In this study, modal profiling will be used, where a detailed narrative description is developed for certain groups within a sample (Tashakkori & Teddlie 1998). The example provided by Tashakkori and Teddlie was a group of women (Tashakkori & Teddlie 1998), but this study will use 'experience' and 'no experience', and 'disaster type' as the basis for groups. The description will be developed from the most frequently occurring features within each group – in Tashakkori and Teddlie's example (Tashakkori & Teddlie 1998, p. 131), the majority of women were 50 years old, so the group was identified as middle-aged. In this disaster information seeking study, the groups will be identified by the most commonly occurring information seeking pathways, which will be developed from the 'alert', 'confirm' and 'most important' variables. Narratives for each group will also be developed from the 'time taken', 'communication with others' and 'what they were looking for' variables.

However, modal profiling will be just the first step in the analysis of the data for this study by providing the foundation groups and information seeking behaviours. A further step needs to be taken to allow consideration of all of the information seeking behaviours that emerge from the narrative, as modal

profiling tends to focus on the most frequently occurring profiles. To extend the analysis to make it more useful for the development of the disaster information seeking model, normative profiling will also be used. This process allows the group and individual profiles to be compared with a standard, which might come from the entire sample or a specific population within the sample (Tashakkori & Teddlie 1998). Tashakkori and Teddlie maintain that different types of profiling might be mixed, depending on the information sought and the aims of the analysis (1998). The danger of oversimplification that they say is a reason for caution when using qualitisation methods will not present an obstacle here because the aim of this study is to put forward an explanation of the process of information seeking rather than to quantify the actions of a sample of the general population. This type of validation mentioned by Tashakkori and Teddlie (1998) needs to be completed when the model foundations have been developed more fully.

There are two sets of respondents considered in this study: those who have experienced a disaster and reported their experience (53.5% of the sample), and those who have not and reported what they thought they might do if they were in a disaster (46.5% of the sample). The data will be considered from these two perspectives. The two groups are explained in the tables below. Of the respondents, 210 had experience in a disaster and 130 reported no experience. Five people did not respond to this question. The obvious skew toward females in the number of respondents was reflected in both groups, with females representing 77.7% of experienced respondents and 81.8% of respondents with no experience. The mean age of both groups was in the 40-55 age groups and the majority of respondents in both groups were either married or in a partnership. University education was also predominant in both groups at almost 71% of respondents in each group, and respondents in both groups were more likely to come from a city or urban environment, with 74% of the experienced respondents in this group and 60% of non-experienced people living in a city. Where the two groups differed was in income: the biggest group of experienced respondents (36.5%) reported a household income of more than $100,000 per year, while the non-experienced respondents were more likely to live in a household that earned $31,000-$80,000 each year. This breakdown between experienced and non-experienced respondents is detailed in Table 5.6. Achieving a spread of 46.5% with no experience through to 53.5% with disaster experience was a good foundation for further analysis.

**Table 5.6 Demographics of respondents by disaster experience**

| | | No response | | Experienced | | Not experienced | | Total | |
|---|---|---|---|---|---|---|---|---|---|
| | | N | % | N | % | N | % | N | % |
| **Age** | Younger than 25 | 1 | 20.0 | 13 | 6.2 | 7 | 5.4 | 21 | 6.1 |
| | 25-39 | 0 | 0.0 | 47 | 22.4 | 21 | 16.2 | 68 | 19.7 |
| | 40-55 | 0 | 0.0 | 96 | 45.7 | 40 | 30.8 | 136 | 39.4 |
| | 56-70 | 1 | 20.0 | 42 | 20.0 | 46 | 35.4 | 89 | 25.8 |
| | 71+ | 3 | 60.0 | 12 | 5.7 | 16 | 12.3 | 31 | 9.0 |
| | **Total** | **5** | **100** | **210** | **100** | **130** | **100** | **345** | **100** |
| **Gender** | Female | 4 | 80.0 | 139 | 66.2 | 101 | 77.7 | 244 | 70.7 |
| | Male | 1 | 20.0 | 71 | 33.8 | 29 | 22.3 | 101 | 29.3 |
| | **Total** | **5** | **100** | **210** | **100** | **130** | **100** | **345** | **100** |
| **Household size** | 1 | 3 | 60.0 | 32 | 15.2 | 23 | 17.7 | 58 | 16.8 |
| | 2 | 1 | 20.0 | 85 | 40.5 | 61 | 46.9 | 147 | 42.6 |
| | 3-4 | 0 | 0.0 | 71 | 33.8 | 39 | 30.0 | 110 | 31.9 |
| | 5 or more | 1 | 20.0 | 22 | 10.5 | 7 | 5.4 | 30 | 8.7 |
| | **Total** | **5** | **100** | **210** | **100** | **130** | **100** | **345** | **100** |
| **Dependents** | None | 4 | 80.0 | 124 | 59.9 | 93 | 73.2 | 221 | 65.2 |
| | 1-2 | 1 | 20.0 | 63 | 30.4 | 29 | 22.8 | 93 | 27.4 |
| | 3-4 | 0 | 0.0 | 19 | 9.2 | 4 | 3.1 | 23 | 6.8 |
| | 5 or more | 0 | 0.0 | 1 | 0.5 | 1 | 0.8 | 2 | 0.6 |
| | **Total** | **5** | **100** | **207** | **100** | **127** | **100** | **339** | **100** |
| **Education** | Primary school | 0 | 0.0 | 20 | 9.5 | 3 | 2.3 | 23 | 6.7 |
| | High/secondary school | 2 | 40.0 | 37 | 17.6 | 25 | 19.4 | 64 | 18.6 |
| | Vocational or trade college | 0 | 0.0 | 49 | 23.3 | 15 | 11.6 | 64 | 18.6 |
| | College/ university | 3 | 60.0 | 104 | 49.5 | 86 | 66.7 | 193 | 56.1 |
| | **Total** | **5** | **100** | **210** | **100** | **129** | **100** | **344** | **100** |
| **Income** | $0-$30,000 | 1 | 50.0 | 24 | 11.9 | 23 | 19.0 | 48 | 14.8 |
| | $31,000 - $80,000 | 1 | 50.0 | 58 | 28.7 | 43 | 35.5 | 102 | 31.4 |
| | $81,000 - $100,000 | 0 | 0.0 | 44 | 21.8 | 24 | 19.8 | 68 | 20.9 |

| | | No response | | Experienced | | Not experienced | | Total | |
|---|---|---|---|---|---|---|---|---|---|
| | More than $100,000 | 0 | 0.0 | 76 | 37.6 | 31 | 25.6 | 107 | 32.9 |
| | **Total** | **2** | **100** | **202** | **100** | **121** | **100** | **325** | **100** |
| **Type of community** | A regional town or semi-rural area | 0 | 0.0 | 62 | 29.5 | 43 | 33.3 | 105 | 30.9 |
| | A rural area | 0 | 0.0 | 29 | 13.8 | 25 | 19.4 | 54 | 15.9 |
| | City or suburb | 1 | 100 | 119 | 56.7 | 61 | 47.3 | 181 | 53.2 |
| | **Total** | **1** | **100** | **210** | **100** | **129** | **100** | **340** | **100** |

### *5.3.1. Disaster type*

Experienced respondents were asked to report the type of disaster they were most recently involved in. Flooding was the most numerous experience reported, with slow flood and flash flood dominating the responses (20.3% and 48.8% respectively). This may have reflected survey's origins in Queensland, where in January 2013, more than 90 towns along the east coast and some way inland flooded after Cyclone Oswald. This analysis provided the detail of the groups to be used in the modal profiling method of the data qualitisation described by Tashakkori and Teddlie (1998). Table 5.7, below, gives details of respondents' disaster experience.

**Table 5.7 Respondents' experience by disaster type**

| | N | % |
|---|---|---|
| Flash flood | 101 | 48.8 |
| Slow flood | 42 | 20.3 |
| Cyclone/hurricane/typhoon | 35 | 16.9 |
| Wildfire or bushfire | 15 | 7.2 |
| Sudden storm | 6 | 2.9 |
| Earthquake | 3 | 1.4 |
| Tsunami | 2 | 1.0 |
| Tornado | 2 | 1.0 |
| Mudslide | 1 | 0.5 |
| **Total** | **207** | **100** |

Of the disaster-experienced group, 26 people were involved in a disaster serious enough that they were requested by emergency agencies to evacuate their house or workplace. The details of the response to this question are below in Table 5.8. This study also considered whether the severity of a disaster (measured by evacuation from home or workplace) might be worth closer examination in future and whether severity might be considered by the disaster information seeking model as an influence on source selection. This will be addressed in section 5.2.3 Influences on source selection.

**Table 5.8 Evacuation rates of respondents**

| | N | % |
|---|---|---|
| No response | 2 | 1.0 |
| Yes | 26 | 12.1 |
| No | 186 | 86.9 |
| **Total** | **214** | **100** |

It is from the experienced group that analysis will be undertaken to draw out the possible pathways of information seeking. The group without disaster experience will be examined for intentions in information seeking behaviour, and

comparisons will be made with the information seeking patterns of those that have experienced a disaster and reported their actions.

It must be noted that the response numbers detailed in forthcoming tables may differ from table to table because some respondents may not have answered the question that the table explains.

### *5.3.2. The first alert*

The first alert emerged as an important component of the disaster information seeking model, so it will be examined from a number of perspectives to see if patterns might exist in the way people search for information in a disaster.

Table 5.9, over the page, reports the alert source for those who had been in a disaster. Those who were not experienced in a disaster reported how they expected that they would first hear of a disaster. The table shows that those without experience seemed to discount the importance of seeing the manifestation of disaster (or learning of it by other environmental cues), but believed they would use friends and family, radio and television, almost to the same extent that those with disaster experience actually did use these three forms of information. The most prevalent forms of alert for disaster-experienced respondents were other people by direct means (22.6% of the disaster-experienced sample), television (18.1%) and environmental cues 17.1%). Non-experienced respondents expected the first alert would come from other people by direct means (19.5% of this sample), television (19.5%) and radio (18.7%).

**Table 5.9 First alert by experienced/not experienced**

| | Experienced | | Not experienced | |
|---|---|---|---|---|
| | **N** | % | **N** | % |
| Other people directly | 45 | 22.6 | 24 | 19.5 |
| Television | 36 | 18.1 | 24 | 19.5 |
| Environmental cues | 34 | 17.1 | 10 | 8.1 |
| Radio | 31 | 15.6 | 23 | 18.7 |
| News or weather website | 19 | 9.5 | 13 | 10.6 |
| Other people indirectly | 13 | 6.5 | 7 | 5.7 |
| Agency contacts/staff | 10 | 5.0 | 11 | 8.9 |
| Agency phone/text message | 5 | 2.5 | 4 | 3.3 |
| Agency social media | 3 | 1.5 | 2 | 1.6 |
| Agency website | 2 | 1.0 | 5 | 4.1 |
| Newspaper | 1 | 0.5 | 0 | 0.0 |
| **Total** | **199** | **100** | **123** | **100** |

The graph in Figure 5.3 gives another perspective of the data.

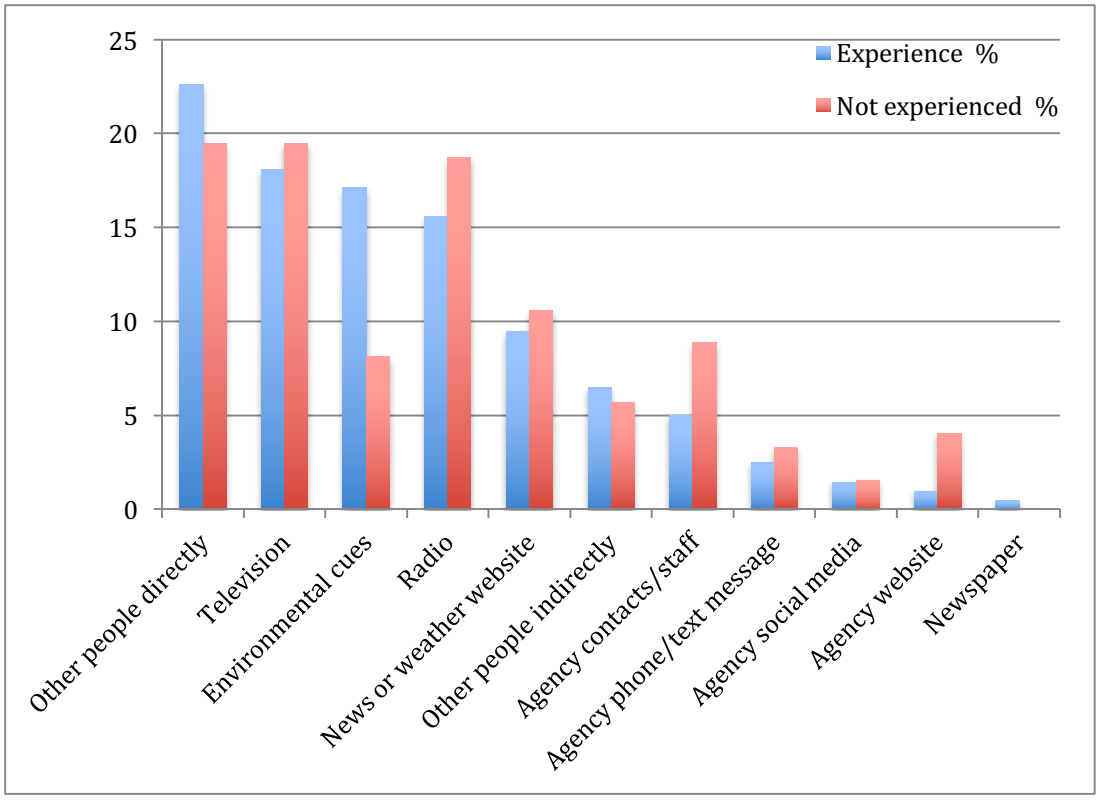



**Figure 5.3 How survey respondents were alerted to, or expected to be alerted to, a disaster**

The next step was to investigate the range of alert sources that emerged according to disaster type. The most prevalent disaster types reported by respondents were: flash flood (n= 95), slow flood (n = 42), followed by cyclone (n=33), fire (n=20), sudden storm (n = 6) and all other disasters (n ≤ 3). Each of the variations of information seeking behaviour can be compared against the model to demonstrate the usefulness of each of the components included in the model so far. For this reason, the alert sources for other disasters that came up in the survey will be discussed, even though the numbers of respondents experienced in each disaster type were very small, ranging from one to six. It is important to plot all information seeking sequences regardless of disaster type as these smaller subsets of the data reveal information seeking patterns not yet reported. Each disaster type will be considered in detail. Further details are in Table 5.11, below.

**Flash flood:** Of the 95 flash flood respondents answering this question, 25.3% learned of the disaster from other people using direct forms such as face-to-face or mobile phone text or voice, and 22.1% learned from environmental cues such

as seeing swollen creeks and experiencing constant rain. The third most often reported first alert for flash flood respondents was television (14.7%) and then equally radio and other people via indirect forms such as email and social media (11.6%). When this was compared with the interviews (reported in Chapter 4) with people who had experienced a flash flood, the similarities are obvious. In the interviews, other people were the most prevalent first alert, with 8 of the 14 interviewees reporting this form. Environmental cues were another key alert source for interviewees (n=4) and ABC Radio another (n=1).

**Slow flood:** In the slow flood group (n = 42), 28.6 % of the group learned that the flood was imminent from television, and 23.8% from radio. Other people (directly) were the alert source for 21.2% of this group and 11.9% learned about the flood from personal contacts in agencies. This was a different experience to those reported by the interview respondents, whose key alert sources were environmental cues (4 of 13 respondents), followed by ABC radio (n=2), other people (n=2) and emergency agency staff (n=2). The BOM website, television and commercial radio also appeared as alert sources (n=1 in each case). Environmental cues were the alert source for just 7.1% of the slow flood survey sample.

**Bushfire:** The first alert for bushfire (n=20) was spread evenly between seeing signs of the disaster such as smoke and radio (25% each). Third most-often reported alert source by the bushfire group was other people by direct means (20%). Next were emergency agency text messages and personal contacts in agencies (10% each) and other people by indirect means such as email or social media (5% each). The interview respondents' named the same set of alert sources but in slightly different order – other people directly were the main source of alert (8 out of 13 respondents), then environmental cues (n=4) and ABC radio (n=1).

**Cyclone:** In cyclone (n=33), the biggest group (30.3%), learned of it from news and weather websites, while the other key alert source was television (24.2%). Third was radio (21.2%) and fourth was other people directly (18.2%). In the interviews, the alert sources were very similar: BOM and radio (4 each out of 11 interviewees), television (n=2) and other people directly (n=1).

**Other disaster types:** The remaining disaster types covered by the survey were not studied in the interviews. However, alert patterns were drawn out from the survey data. The most prevalent first alert reported by the sudden storm respondents were other people directly (2 of the 6 respondents), environmental cues, radio, news or weather website, and personal contacts in emergency agencies (n=1 for each). The earthquake alert was environmental cues for all three respondents, and the tornado alerts were television and news and weather website (n=1 for each). The tsunami alert sources were other people directly and news or weather website (n=1 for each) and the mudslide alert source was other people directly (n=1).

This data is contained in Table 5.10, over the page.

**Table 5.10 First alert by disaster type**

| Alert source | | Disaster type | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Flash flood | Slow flood | Cyclone/hurricane /typhoon | Wildfire or bushfire | Sudden storm | Earthquake | Tornado | Tsunami | Mudslide | **Total** |
| Other people directly | N | 11 | 4 | 1 | 3 | 1 | 1 | 1 | 0 | 0 | **22** |
| | % | 11.3 | 9.5 | 3.1 | 15.0 | 16.7 | 33.3 | 50.0 | 0.0 | 0.0 | **10.7** |
| Other people indirectly | N | 2 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | **4** |
| | % | 2.1 | 0.0 | 0.0 | 5.0 | 16.7 | 0.0 | 0.0 | 0.0 | 0.0 | **2.0** |
| Environmental cues | N | 1 | 1 | 0 | 1 | 2 | 0 | 1 | 0 | 0 | **6** |
| | % | 1.0 | 2.4 | 0.0 | 5.0 | 33.3 | 0.0 | 50.0 | 0.0 | 0.0 | **2.9** |
| Agency phone/text message | N | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** |
| | % | 0.0 | 2.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **0.5** |
| Radio | N | 20 | 5 | 4 | 6 | 1 | 1 | 0 | 1 | 0 | **38** |
| | % | 20.6 | 11.9 | 12.5 | 30.0 | 16.7 | 33.3 | 0.0 | 50.0 | 0.0 | **18.5** |
| Television | N | 19 | 8 | 4 | 2 | 1 | 0 | 0 | 0 | 0 | **34** |
| | % | 19.6 | 19.0 | 12.5 | 10.0 | 16.7 | 0.0 | 0.0 | 0.0 | 0.0 | **16.6** |
| Newspaper | N | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **2** |
| | % | 1.0 | 2.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **1.0** |
| News/ weather website | N | 30 | 10 | 19 | 0 | 0 | 0 | 0 | 0 | 1 | **60** |
| | % | 30.9 | 23.8 | 59.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100.0 | **29.3** |
| Agency contacts/staff | N | 2 | 3 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | **7** |
| | % | 2.1 | 7.1 | 0.0 | 5.0 | 0.0 | 33.3 | 0.0 | 0.0 | 0.0 | **3.4** |
| Agency social media | N | 4 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | **8** |
| | % | 4.1 | 4.8 | 3.1 | 5.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **3.9** |
| Agency website | N | 7 | 7 | 3 | 5 | 0 | 0 | 0 | 1 | 0 | **23** |
| | % | 7.2 | 16.7 | 9.4 | 25.0 | 0.0 | 0.0 | 0.0 | 50.0 | 0.0 | **11.2** |
| **Total** | **N** | **97** | **42** | **32** | **20** | **6** | **3** | **2** | **2** | **1** | **205** |
| | **%** | **100** | **100** | **100** | **100** | **100** | **100** | **100** | **100** | **100** | **100** |

The data also featured responses from people who had not experienced a disaster in the past two years, but who were asked how they thought they might first hear of a disaster. The data collected on anticipated first alert sources from respondents who had not experienced a disaster in the past two years (n=123) showed how people thought they would receive the news. Because these answers could not be compared against a disaster type, they were compared with the experiences of those that had been through a disaster within the past two years (n=199). This was reported earlier in Table 5.10 and showed that individuals underestimate the importance of environmental cues to the first alert process, with 8.1% of inexperienced people expecting to learn of a disaster from this source, while in reality, 17.1% of the experienced people learned of the disaster from some type of environmental cue. The remaining alert sources were similar across the two groups.

### *5.3.3. Confirmation sources*

After the component of the model that allowed consideration of the influence of source selection on the information seeking process, which was examined in the previous section, the model investigates sources used by information seekers. The disaster information seeking model provides the foundation for sequence of sources and the importance of sources to be investigated. A key part of this sequence was discovered in the literature review in the risk communication for natural hazards model presented by Mileti and his colleagues (Mileti 1995; Mileti & Fitzpatrick 1992; Mileti & O'Brien 1992; Mileti & Sorensen 1990), which was the confirmation stage of the information seeking process. Mileti et al. considered the confirmation process a critical part of the reaction to news of a disaster. For these reasons, the interviews and survey asked questions about the confirmation source. Table 5.16, below, identifies the most often used confirmation sources by disaster experienced respondents, and compares them with the confirmation sources that not experienced respondents expected they might use in the same situation. News and weather websites were the most often used confirmation source (30% of experienced respondents) and also considered the most likely confirmation source (23.4% of not experienced respondents), and this combined with the use of agency websites (11 %of experienced and 16.1 %of not experienced), cements the role of emergency the internet in emergency management. Mainstream media also holds an important place as a confirmation source in both actual and intended behaviour, with 17.5% of experienced respondents turning to radio and television each, while 18.5% of not experienced

people expected they would use radio as their confirmation source, and 8.1% expecting to use television. Table 5.11 below shows the details of each confirmation source.

**Table 5.11 Confirmation source comparing experienced with not experienced respondents**

| Confirmation source | Experienced | | Not experienced | | Total | |
|---|---|---|---|---|---|---|
| | N | % | N | % | **N** | **%** |
| News or weather website | 60 | 30.0 | 29 | 23.4 | **89** | **27.3** |
| Radio | 35 | 17.5 | 23 | 18.5 | **59** | **18.1** |
| Television | 35 | 17.5 | 10 | 8.1 | **45** | **13.8** |
| Agency website | 22 | 11.0 | 20 | 16.1 | **42** | **12.9** |
| Other people directly | 20 | 10.0 | 13 | 10.5 | **34** | **10.4** |
| Agency social media | 8 | 4.0 | 7 | 5.6 | **15** | **4.6** |
| Agency contacts | 7 | 3.5 | 9 | 7.3 | **16** | **4.9** |
| Environmental cues | 6 | 3.0 | 4 | 3.2 | **10** | **3.1** |
| Other people indirectly | 4 | 2.0 | 2 | 1.6 | **6** | **1.8** |
| Newspaper | 2 | 1.0 | 0 | 0.0 | **2** | **0.6** |
| Agency text or phone message | 1 | 0.5 | 7 | 5.6 | **8** | **2.5** |
| **Total** | **200** | **100** | **124** | **100** | **326** | **100** |

The next step was to investigate the range of confirmation sources that emerged according to disaster type. Table 5.12 on the next page gives a summary of how much each source was used to confirm what was happening by experienced respondents. Confirmation sources were clustered around radio, television, news and weather websites and agency websites. In a sudden storm and tornado, environmental cues were an important confirmation source, but not a significant source at this stage of information seeking for other disasters. Radio was the most often used confirmation source in a bushfire (30% of the 20 bushfire respondents), while agency websites (25%) was the next most reported confirmation source for bushfire-experienced respondents. In a cyclone or flood, news and weather websites were sources the most often reported as the confirmation source – 59.4% of the 32 cyclone respondents turned to this source when they first heard of the cyclone; 30.9% of the 97 flash flood respondents, and

23.8% of the 42 slow flood respondents. Other slow flood confirmation sources were television (19%) and agency websites (16.7%), and flash flood alternatives were radio (20.6%) and television (19.6%).

**Table 5.12 Confirmation source by disaster type**

| Confirmation source | | Disaster type | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Sudden storm | Earthquake | Wildfire or bushfire | Cyclone/ hurricane/ typhoon | Tornado | Flash flood | Slow flood | Tsunami | Mudslide | Total |
| **Other people directly** | N | 1 | 1 | 3 | 1 | 1 | 11 | 4 | 0 | 0 | **22** |
| | % | 16.7 | 33.3 | 15.0 | 3.1 | 50.0 | 11.3 | 9.5 | 0.0 | 0.0 | **10.7** |
| **Other people indirectly** | N | 1 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | **4** |
| | % | 16.7 | 0.0 | 5.0 | 0.0 | 0.0 | 2.1 | 0.0 | 0.0 | 0.0 | **2.0** |
| **Environmental cues** | N | 2 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | **6** |
| | % | 33.3 | 0.0 | 5.0 | 0.0 | 50.0 | 1.0 | 2.4 | 0.0 | 0.0 | **2.9** |
| **Agency phone/text message** | N | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | **1** |
| | % | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.4 | 0.0 | 0.0 | **0.5** |
| **Radio** | N | 1 | 1 | 6 | 4 | 0 | 20 | 5 | 1 | 0 | **38** |
| | % | 16.7 | 33.3 | 30.0 | 12.5 | 0.0 | 20.6 | 11.9 | 50.0 | 0.0 | **18.5** |
| **Television** | N | 1 | 0 | 2 | 4 | 0 | 19 | 8 | 0 | 0 | **34** |
| | % | 16.7 | 0.0 | 10.0 | 12.5 | 0.0 | 19.6 | 19.0 | 0.0 | 0.0 | **16.6** |
| **Newspaper** | N | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | **2** |
| | % | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 2.4 | 0.0 | 0.0 | **1.0** |
| **News/weather website** | N | 0 | 0 | 0 | 19 | 0 | 30 | 10 | 0 | 1 | **60** |
| | % | 0.0 | 0.0 | 0.0 | 59.4 | 0.0 | 30.9 | 23.8 | 0.0 | 100.0 | **29.3** |
| **Agency contacts/staff** | N | 0 | 1 | 1 | 0 | 0 | 2 | 3 | 0 | 0 | **7** |
| | % | 0.0 | 33.3 | 5.0 | 0.0 | 0.0 | 2.1 | 7.1 | 0.0 | 0.0 | **3.4** |
| **Agency social media** | N | 0 | 0 | 1 | 1 | 0 | 4 | 2 | 0 | 0 | **8** |
| | % | 0.0 | 0.0 | 5.0 | 3.1 | 0.0 | 4.1 | 4.8 | 0.0 | 0.0 | **3.9** |
| **Agency website** | N | 0 | 0 | 5 | 3 | 0 | 7 | 7 | 1 | 0 | **23** |
| | % | 0.0 | 0.0 | 25.0 | 9.4 | 0.0 | 7.2 | 16.7 | 50.0 | 0.0 | **11.2** |
| **Total** | **N** | **6** | **3** | **20** | **32** | **2** | **97** | **42** | **2** | **1** | **205** |
| | % | **100** | **100** | **100** | **100** | **100** | **100** | **100** | **100** | **100** | **100** |

The following graph, Figure 5.4, provides a picture of the data. The outlier, mudslide, which had just one person, has been left out of the graph to allow a closer look at the data from the other disaster types.

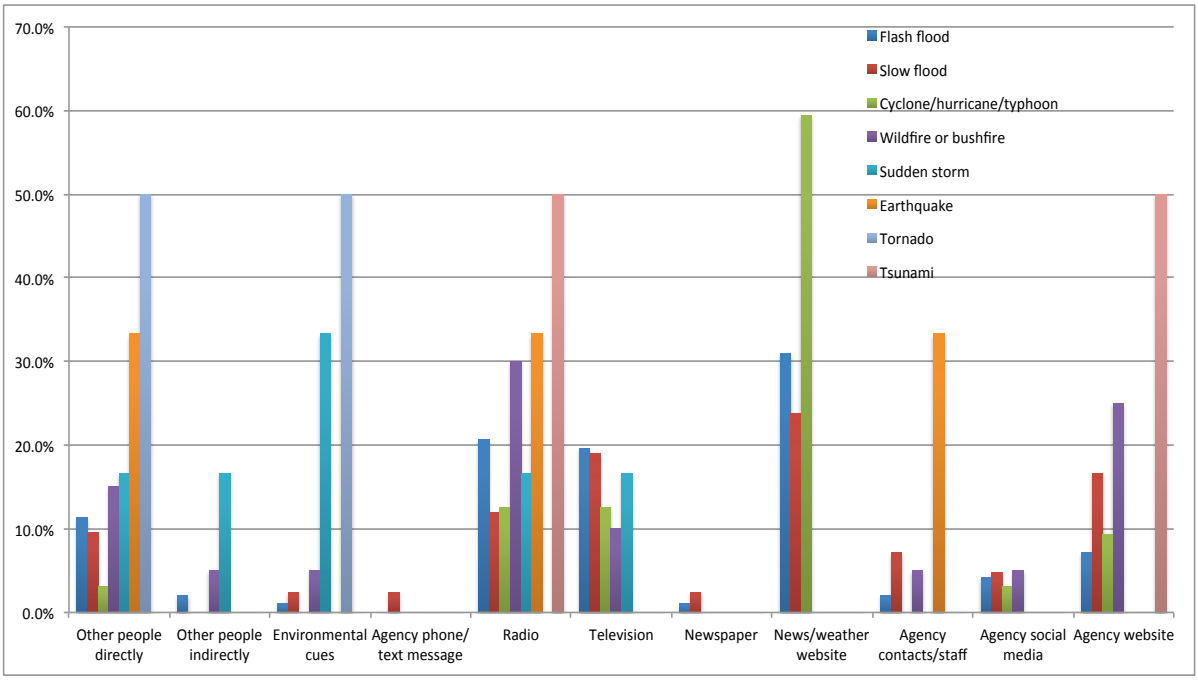



**Figure 5.4 Confirmation sources by disaster type**

## *5.3.4. Information pathways*

The information pathway is determined by combining all of the components of the disaster information seeking model to establish patterns. The beginning of information seeking pathways can be investigated using the survey data by investigating where people turn for more information once they have received an alert from a certain source. The information pathways used in different disasters types will be examined in this section and discussed. Firstly, information pathways recounted by all of the experienced respondents will be considered. Then the data will be examined through the filter of disaster type.

### 5.3.4.1. First alert and subsequent confirmation source

The most prevalent first alerts for disaster experienced respondents were other people directly (synchronous methods such as face-to-face, phone call or text, n= 45, 22.6% of the sample), environmental cues and television (n=34, 17.4%) and then radio (n=30, 15.4%). The most prevalent confirmation sources were news or

weather websites (n=59, 30.2%), followed by radio (n=34, 17.4%) and television (n=32, 16.4%). The most prevalent information pathway starts with other people directly as the alert, then confirmation via a news or weather website (n=17, 8.7% of the total experienced sample). The second most prevalent pathways were other people directly for the alert and then television for the confirmation, and television as the alert and then a news or weather website for confirmation (both n=13, 6.7%). Newspaper was the least used source either as an alert or a confirmation, and figures in the information pathway of one person from the experienced sample. Social media figures in the information pathways of 14 people (7.2%, measured by other people indirectly and agency social media) but may feature as important sources later in the analysis. Table 5.13 provides the details, and Figure 5.5, below the table, gives an illustration of the information pathways and prevalence of some sources in these.

**Table 5.13 Information pathways measured by alert then confirmation sources**

| | Confirmation source | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Alert source* | Other people directly | Other people indirectly | Environmental cues | Agency phone/text message | Radio | Television | Newspaper | News/weather website | Agency contacts/staff | Agency social media | Agency website | **Total** |
| **Other people directly** | 2 | 1 | 1 | 0 | 7 | 13 | 0 | 17 | 1 | 1 | 2 | **45** |
| **Environmental cues** | 5 | 0 | 2 | 0 | 8 | 5 | 0 | 6 | 2 | 1 | 5 | **34** |
| **Television** | 4 | 1 | 1 | 1 | 4 | 4 | 1 | 13 | 0 | 3 | 2 | **34** |
| **Radio** | 3 | 0 | 1 | 0 | 10 | 5 | 0 | 8 | 0 | 0 | 3 | **30** |
| **News/weather website** | 1 | 1 | 1 | 0 | 2 | 1 | 0 | 7 | 1 | 0 | 4 | **18** |
| **Other people indirectly** | 1 | 0 | 0 | 0 | 0 | 3 | 0 | 6 | 0 | 2 | 1 | **13** |
| **Agency contacts/staff** | 3 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 3 | 0 | 0 | **10** |
| **Agency phone/text message** | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | **5** |
| **Agency social media** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | **3** |
| **Agency website** | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | **2** |
| **Newspaper** | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** |
| **Total** | **20** | **4** | **6** | **1** | **34** | **32** | **2** | **59** | **7** | **8** | **22** | **195** |

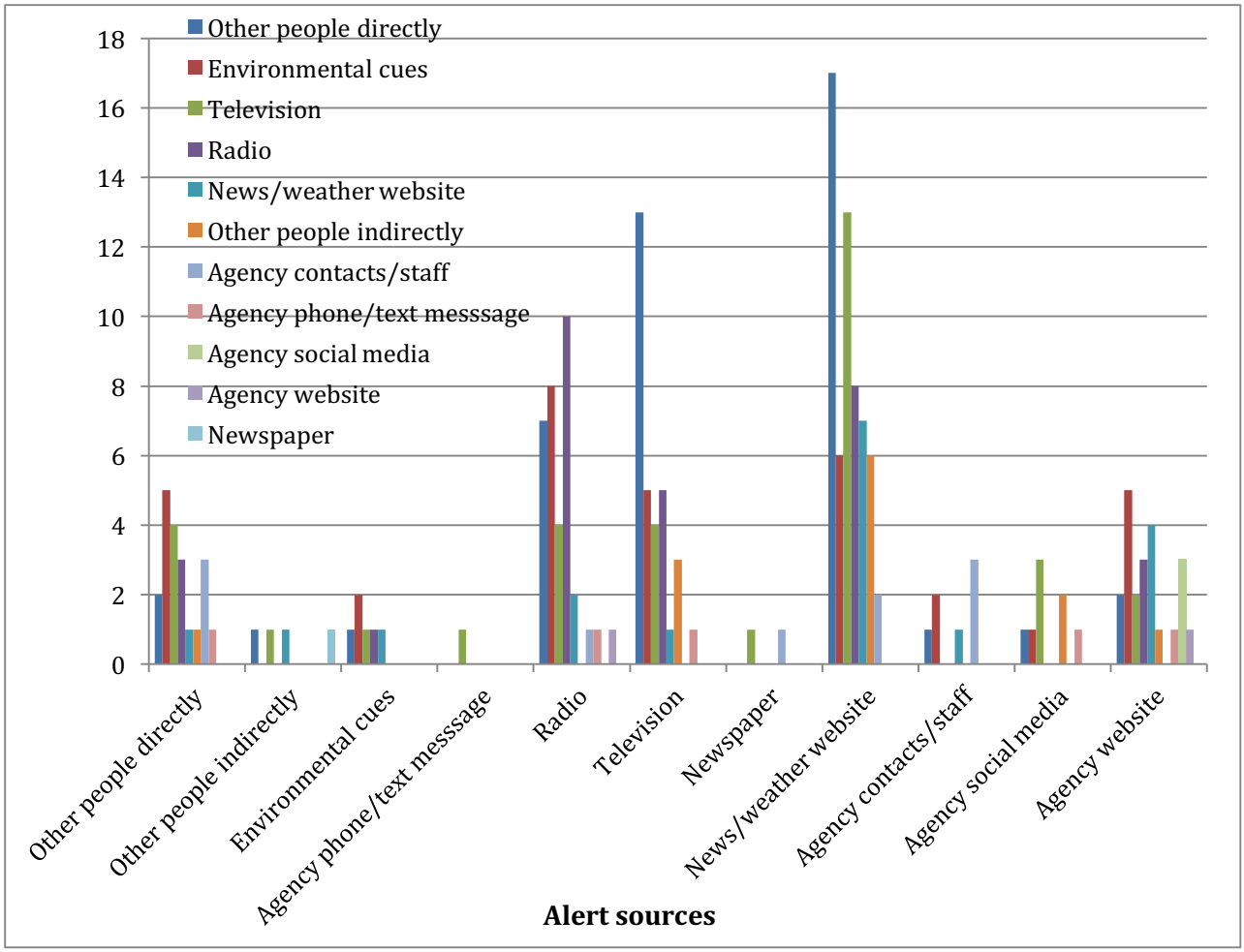



**Figure 5.5 Alert and associated confirmation sources for each disaster type**

This section will now investigate information pathways for each disaster type.

### 5.3.4.2. Flash flood

Flash flood was the disaster type with the greatest number of responses and therefore the largest number of information pathways. The alerts and confirmation sources for flash flood were:

- others directly (alert), then confirmed by others directly (2), radio (5), television (7), news or weather website, agency social media or agency website;
- others indirectly, then others directly, television (3), news or weather website (5), agency social media, or agency website;
- environmental cues, then others directly (3), further environmental cues, radio (6), television (4), news or weather website (5), agency contacts, or agency website;

- agency text/phone message, then radio or agency social media;
- radio, then others directly (2), further radio (4), television (2), or news or weather website (3);
- television, then others directly (2), others indirectly, radio (2), television, news and weather website (5), agency social media or agency website;
- newspaper, then others indirectly;
- news or weather website, then others directly, radio, news or weather website (2) or agency contacts;
- agency contacts, then newspaper or news or weather website (2);
- agency social media, then agency website (2); and
- agency website, then agency website again.

These are illustrated more clearly in Table 5.14 on the next page.

**Table 5.14 Information pathways enacted during the flash flood**

| First alert received from: | Confirmation source: | Numbers using this pathway: |
|---|---|---|
| Other people directly (n = 24) | News or weather websites | 8 |
| | Television | 7 |
| | Radio | 5 |
| | Direct contact with family / friends / neighbours | 2 |
| | Agency social media | 1 |
| | Agency website | 1 |
| Environmental cues (n=24) | Radio | 6 |
| | News / weather website / s | 5 |
| | Television | 3 |
| | Direct contact with friends / family / neigbours | 3 |
| | Environmental cues | 1 |
| | Personal contacts in an agency / council | 1 |
| | Agency website | 1 |
| Television (n=13) | News and weather website | 5 |
| | Radio | 2 |
| | Direct contact with family / friends / neighbours | 2 |
| | Television | 1 |
| | Indirect contact with family / friends / neighbours | 1 |
| | Agency social media | 1 |
| | Agency website | 1 |
| Other people indirectly (n = 11) | News / weather website / s | 5 |
| | Television | 3 |
| | Agency social media | 1 |
| | Agency website | 1 |
| | Direct contact with family / friends / neighbours | 1 |
| Radio (n = 11) | Radio | 4 |
| | News / weather website / s | 3 |
| | Television | 2 |
| | Direct contact with family / friends / neighbours | 2 |
| News / weather website / s (n = | News / weather website / s | 2 |

| First alert received from: | Confirmation source: | Numbers using this pathway: |
|---|---|---|
| 5) | Personal contacts within an agency or council | 1 |
| | Radio | 1 |
| | Direct contact with family/friends/neighbours | 1 |
| Agency contacts/staff (n =3) | News/weather website/s | 2 |
| | Newspaper | 1 |
| Agency social media (n = 2) | Agency or council website | 2 |
| Agency website (n = 1) | News/weather website/s | 1 |
| Newspaper (n = 1) | Indirect contact with friends/family/neighbours (eg email, social media) | 1 |

#### 5.3.4.3. Slow flood

Slow flood was another disaster type that attracted a good number of responses. The information pathways revealed were (alert, then confirmation source):

- others directly, then television (3), news or weather website (3) or agency website;
- others indirectly, then news or weather website;
- environmental cues, then others directly, radio or television;
- agency text/phone message, then agency website.
- radio, then radio again (4), television (2), news or weather website (2), or agency website (2).
- television, then others directly, environmental cues, agency text or phone message, television (2), newspaper, news or weather website (3), agency social media (2) or agency website;
- news or weather website, then news or weather website or agency website;
- agency contacts, then others directly (2) or agency contacts (3);
- agency social media, then agency website.

The information pathways for flash flood are more clearly illustrated in Table 5.15.

**Table 5.15 Information pathways enacted during a slow flood**

| First alert received from: | Confirmation source: | Numbers using this pathway: |
|---|---|---|
| Television (n = 12) | News / weather website / s | 3 |
| | Television | 2 |
| | Agency social media | 2 |
| | Agency website | 1 |
| | Newspaper | 1 |
| | Direct contact with family / friends / neighbours | 1 |
| | Agency message | 1 |
| Radio (n = 10) | Radio | 4 |
| | Television | 2 |
| | News / weather website / s | 2 |
| | Agency website | 2 |
| Other people directly (n = 7) | News / weather website / s | 3 |
| | Television | 3 |
| | Agency website | 1 |
| Agency contacts / staff (n = 5) | Personal contacts in emergency agencies or council | 3 |
| | Direct contact with family / friends / neighbours | 2 |
| Environmental cues (n = 3) | Radio | 1 |
| | Television | 1 |
| | Direct contact with family / friends / neighbours | 1 |
| News / weather website / s (n = 2) | News / weather website / s | 1 |
| | Agency website | 1 |
| Other people indirectly (n = 1) | News / weather website / s | 1 |
| Agency social media (n = 1) | Agency website | 1 |
| Agency phone or text message (n = 1) | Agency social media | 1 |

### 5.3.4.4. Bushfire

Bushfire-experienced respondents numbered 19, and provided 15 different information pathways: other people directly then other people indirectly/environmental cues/television/agency contacts; other people indirectly then agency websites; environmental cues then radio/agency social media/ agency websites; agency text message then other people directly/television; radio then other people directly/radio again; agency contacts then radio/agency websites; and agency websites then radio. Table 5.16, below, illustrates the information pathways.

**Table 5.16 Information pathways enacted in a bushfire**

| First alert received from: | Confirmation source: | Numbers using this pathway: |
|---|---|---|
| Environmental cues (n = 5) | Agency website | 3 |
| | Agency social media | 1 |
| | Radio | 1 |
| Radio (n = 4) | Radio | 2 |
| | Other people directly | 2 |
| Other people directly (n = 4) | Environmental cues | 1 |
| | Other people indirectly | 1 |
| | Television | 1 |
| | Agency contacts/staff | 1 |
| Agency message (n = 2) | Television | 1 |
| | Other people directly | 1 |
| Agency contacts/staff (n = 2) | Radio | 1 |
| | Agency website | 1 |
| Agency website (n = 1) | Radio | 1 |
| Other people indirectly (n = 1) | Agency website | 1 |

### 5.3.4.5. Cyclone

Another large group was cyclone-experienced respondents (n=31). News and weather websites were the predominant alert source (9) and from there, confirmation sources were other people directly, radio, television, news and weather websites (4) and agency websites (2). Radio was the second most reported alert source (7). Confirmation sources used in tandem with this alert source were radio again (2), television, news or weather websites (3) and agency websites. Equal second most occurring alert source was television, used with these confirmation sources Other people were the fourth most reported alert source (6), from which respondents went to television, news or weather websites (5) and agency social media. Table 5.17 illustrates these linkages more clearly.

**Table 5.17 Information pathways enacted in a cyclone**

| First alert received from: | Confirmation source: | Numbers using this pathway: |
|---|---|---|
| News and weather websites (n = 9) | News and weather websites | 4 |
| | Agency websites | 2 |
| | Television | 1 |
| | Direct contact with family/friends/neighbours | 1 |
| | Radio | 1 |
| Radio (n = 7) | News/weather website/s | 3 |
| | Radio | 2 |
| | Agency website | 1 |
| | Television | 1 |
| Television (n = 7) | News and weather websites | 5 |
| | Television | 1 |
| | Radio | 1 |
| Other people directly (n = 6) | News and weather websites | 5 |
| | Television | 1 |
| Environmental cues (n = 1) | News/weather website/s | 1 |
| Other people indirectly (n=1) | Agency social media | 1 |

### 5.3.4.6. Storm

Table 5.23 shows the experiences of respondents in a storm. Six people experienced a serious storm, and six different information pathways from alert to confirmation were reported: other people directly then radio; other people directly then television; environmental cures then further environmental cues; radio then environmental cues; news or weather website then others indirectly; and agency contacts then other people directly. Because the interview phase did not include a storm, no comparisons can be made with the first stage of the research. The alert and confirmation source connections for storm are illustrated more clearly in Table 5.18.

**Table 5.18 Information pathways enacted in a storm**

| First alert received from: | Confirmation source: | Numbers using this pathway: |
|---|---|---|
| Other directly people (n = 2) | Television | 1 |
| | Radio | 1 |
| Environmental cues (n = 1) | Environmental cues | 1 |
| Radio (n = 1) | Environmental cues | 1 |
| News/weather website (n = 1) | Other people indirectly | 1 |
| Agency contacts/staff (n = 1) | Other people directly | 1 |

### 5.3.4.7. Earthquake

Three people experienced an earthquake, and as expected, environmental cues were the first alert for all respondents. However, their pathways diverged when it came to the confirmation source, with other people directly, radio, and agency contacts used. As with the sudden storm, the interviews did not cover earthquake, and so no comparisons can be made between with interview and survey data. Table 5.19 illustrates the connections between alert and confirmation sources in earthquake.

**Table 5.19 Information pathways enacted in an earthquake**

| First alert received from: | Confirmation source: | Numbers using this pathway: |
|---|---|---|
| Environmental cues (n = 3) | Other people directly | 1 |
| | Radio | 1 |
| | Agency contacts/staff | 1 |

### 5.3.4.8. Tornado

The survey produced just two responses for tornado, with one alert from television and confirmation made via other people directly, and the other alert from news or weather website, and confirmation made via environmental cues. Table 5.20 shows the progression from alert to confirmation in a tornado.

**Table 5.20 Information pathways enacted in a tornado**

| First alert received from: | Confirmation source: | Numbers using this pathway: |
|---|---|---|
| Television (n = 1) | Direct contact with family/friends/neighbours (eg face-to-face, phone call or text) | 1 |
| News/weather website/s (n = 1) | Environmental cues | 1 |

### 5.3.4.9. Tsunami

The survey received few responses for tsunami (2) and mudslide (1) . The information pathways for tsunami were others directly as the alert, then radio, and news and weather website, then agency website and are clarified in Table 5.21.

**Table 5.21 Information pathways enacted in a tsunami**

| First alert received from: | Confirmation source: | Numbers using this pathway: |
|---|---|---|
| Other people directly (n = 1) | Radio | 1 |
| News/weather website/s (n = 1) | Agency website | 1 |

### 5.3.4.10. Mudslide

For mudslide, the information pathway started with an alert from others directly, then followup via a news or weather website and is shown in Table 5.22.

**Table 5.22 Information pathways enacted in a mudslide**

| First alert received from: | Confirmation source: | Numbers using this pathway: |
|---|---|---|
| Other people directly (n = 1) | News/weather website/s | 1 |

### 5.3.4.11. Information pathways – a summary

In summary, the most common information pathways per disaster type were:

- flash flood – others directly, then news or weather website;
- slow flood – television, then news or weather websites;
- bushfire – environmental cues, then agency website;
- cyclone – news or weather website, then further searching of news or weather websites;
- sudden storm – others directly, then radio or television;

- earthquake – environmental cues then radio, other people or agency contacts;
- tornado – television or news or weather website, then others directly or environmental cues;
- tsunami – other people or news and weather website, then radio and agency websites;
- mudslide – other people, then news or weather website.

In all, news and weather website was nominated as an alert or confirmation source 77 times, others directly 66 times, and radio 64 times. The next most recurrent source in alert/confirmation stages of the information seeking process was television, mentioned 53 times. Table 5.23 provides a summary.

**Table 5.23 Information pathways from the alert source**

| | | Confirmation source | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Direct others | Indirect others | Environment | Agency message | Radio | Television | Newspaper | News or weather website | Agency contacts | Agency SM | Agency web | |
| | Alert source | N | N | N | N | N | N | N | N | N | N | N | Total |
| **Flash flood** | Direct others | 2 | | | | 5 | 7 | | 8 | | 1 | 1 | 24 |
| | Indirect others | 1 | | | | | 3 | | 5 | | 1 | 1 | 11 |
| | Environment | 3 | | 1 | | 6 | 4 | | 5 | 1 | | 1 | 21 |
| | Agency message | | | | | 1 | | | | | 1 | | 2 |
| | Radio | 2 | | | | 4 | 2 | | 3 | | | | 11 |
| | Television | 2 | 1 | | | 2 | 1 | | 5 | | 1 | 1 | 1 |
| | Newspaper | | 1 | | | | | | | | | | 1 |
| | News or weather website | 1 | | | | 1 | | | 2 | 1 | | | 5 |
| | Agency contacts | | | | | | | 1 | 2 | | | | 3 |
| | Agency SM | | | | | | | | | | | 2 | 2 |
| | Agency web | | | | | | | | | | | 1 | 1 |
| | | **11** | **2** | **1** | **0** | **19** | **17** | **1** | **30** | **2** | **4** | **7** | **94** |
| **Slow flood** | Direct others | | | | | | 3 | | 3 | | | 1 | 7 |
| | Indirect others | | | | | | | | 1 | | | | 1 |
| | Environment | 1 | | | | 1 | 1 | | | | | | 3 |
| | Agency message | | | | | | | | | | | 1 | 1 |
| | Radio | | | | | 4 | 2 | | 2 | | | 2 | 10 |
| | Television | 1 | | 1 | 1 | | 2 | 1 | 3 | | 2 | 1 | 12 |
| | Newspaper | | | | | | | | | | | | 0 |
| | News or weather website | | | | | | | | 1 | | | 1 | 2 |
| | Agency contacts | 2 | | | | | | | | 3 | | | 5 |
| | Agency SMS | | | | | | | | | | | 1 | 1 |
| | Agency web | | | | | | | | | | | | 0 |
| | | **4** | **0** | **1** | **1** | **5** | **8** | **1** | **10** | **3** | **2** | **7** | **42** |
| **Wildfire or bushfire** | Direct others | | 1 | 1 | | | 1 | | | 1 | | | 4 |
| | Indirect others | | | | | | | | | | | | 0 |
| | Environment | | | | | 1 | | | | | 1 | 3 | 5 |
| | Agency message | 1 | | | | | 1 | | | | | | 2 |
| | Radio | 2 | | | | 2 | | | | | | | 4 |
| | Television | | | | | | | | | | | | 0 |
| | Newspaper | | | | | | | | | | | | 0 |
| | News or weather website | | | | | | | | | | | | 0 |
| | Agency contacts | | | | | 1 | | | | | | 1 | 2 |
| | Agency SMS | | | | | | | | | | | | 0 |
| | Agency web | | | | | 1 | | | | | | | 1 |
| | | **3** | **1** | **1** | **0** | **5** | **2** | **0** | **0** | **1** | **1** | **5** | **19** |

| | | Confirmation source | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Direct others | Indirect others | Environment | Agency message | Radio | Television | Newspaper News or weather website | Agency contacts | Agency SMS | Agency web | | |
| | Alert source | N | N | N | N | N | N | N | N | N | N | N | Total |
| **Cyclone/hurricane/typhoon** | Direct others | | | | | | 1 | | 5 | | | | 6 |
| | Indirect others | | | | | | | | | 1 | | | 1 |
| | Environment | | | | | | | | 1 | | | | 1 |
| | Agency message | | | | | | | | | | | | 0 |
| | Radio | | | | | 2 | 1 | | 3 | | | 1 | 7 |
| | Television | | | | | 1 | 1 | | 5 | | | | 7 |
| | Newspaper | | | | | | | | | | | | 0 |
| | News or weather website | 1 | | | | 1 | 1 | | 4 | | | 2 | 9 |
| | Agency contacts | | | | | | | | | | | | 0 |
| | Agency SMS | | | | | | | | | | | | 0 |
| | Agency web | | | | | | | | | | | | 0 |
| | | **1** | **0** | **0** | **0** | **4** | **4** | **0** | **18** | **0** | **1** | **3** | **31** |
| **Sudden storm** | Direct others | | | | | 1 | 1 | | | | | | 2 |
| | Indirect others | | | | | | | | | | | | 0 |
| | Environment | | | 1 | | | | | | | | | 1 |
| | Agency message | | | | | | | | | | | | 0 |
| | Radio | | | 1 | | | | | | | | | 1 |
| | Television | | | | | | | | | | | | 0 |
| | Newspaper | | | | | | | | | | | | 0 |
| | News or weather website | | 1 | | | | | | | | | | 1 |
| | Agency contacts | 1 | | | | | | | | | | | 1 |
| | Agency SMS | | | | | | | | | | | | 0 |
| | Agency web | | | | | | | | | | | | 0 |
| | | **1** | **1** | **2** | **0** | **1** | **1** | **0** | **0** | **0** | **0** | **0** | **6** |
| **Earthquake** | Direct others | | | | | | | | | | | | 0 |
| | Indirect others | | | | | | | | | | | | 0 |
| | Environment | 1 | | | | 1 | | | | 1 | | | 3 |
| | Agency message | | | | | | | | | | | | 0 |
| | Radio | | | | | | | | | | | | 0 |
| | Television | | | | | | | | | | | | 0 |
| | Newspaper | | | | | | | | | | | | 0 |
| | News or weather website | | | | | | | | | | | | 0 |
| | Agency contacts | | | | | | | | | | | | 0 |
| | Agency SMS | | | | | | | | | | | | 0 |
| | Agency web | | | | | | | | | | | | 0 |
| | | **1** | **0** | **0** | **0** | **1** | **0** | **0** | **0** | **1** | **0** | **0** | **3** |

| | | Confirmation source | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Direct others | Indirect others | Environment | Agency message | Radio | Television | Newspaper News or weather website | Agency contacts | Agency SMS | Agency web | | |
| | Alert source | N | N | N | N | N | N | N | N | N | N | N | Total |
| **Tornado** | Direct others | | | | | | | | | | | | 0 |
| | Indirect others | | | | | | | | | | | | 0 |
| | Environment | | | | | | | | | | | | 0 |
| | Agency message | | | | | | | | | | | | 0 |
| | Radio | | | | | | | | | | | | 0 |
| | Television | 1 | | | | | | | | | | | 1 |
| | Newspaper | | | | | | | | | | | | 0 |
| | News or weather website | | | 1 | | | | | | | | | 1 |
| | Agency contacts | | | | | | | | | | | | 0 |
| | Agency SMS | | | | | | | | | | | | 0 |
| | Agency web | | | | | | | | | | | | 0 |
| | | **1** | **0** | **1** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **2** |
| **Tsunami** | **Direct others** | | | | | 1 | | | | | | | **1** |
| | Indirect others | | | | | | | | | | | | 0 |
| | Environment | | | | | | | | | | | | 0 |
| | Agency message | | | | | | | | | | | | 0 |
| | Radio | | | | | | | | | | | | 0 |
| | Television | | | | | | | | | | | | 0 |
| | Newspaper | | | | | | | | | | | | 0 |
| | News or weather website | | | | | | | | | | | 1 | 1 |
| | Agency contacts | | | | | | | | | | | | 0 |
| | Agency SMS | | | | | | | | | | | | 0 |
| | Agency web | | | | | | | | | | | | 0 |
| | | **0** | **0** | **0** | **0** | **1** | **0** | **0** | **0** | **0** | **0** | **1** | **2** |
| **Mudslide** | Direct others | | | | | | | | 1 | | | | 1 |
| | Indirect others | | | | | | | | | | | | 0 |
| | Environment | | | | | | | | | | | | 0 |
| | Agency message | | | | | | | | | | | | 0 |
| | Radio | | | | | | | | | | | | 0 |
| | Television | | | | | | | | | | | | 0 |
| | Newspaper | | | | | | | | | | | | 0 |
| | News or weather website | | | | | | | | | | | | 0 |
| | Agency contacts | | | | | | | | | | | | 0 |
| | Agency SMS | | | | | | | | | | | | 0 |
| | Agency web | | | | | | | | | | | | 0 |
| | | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **1** | **0** | **0** | **0** | **1** |

### 5.3.5. *Most important information sources*

The interviews revealed that respondents had trouble identifying just one source as a most important source, so the survey asked respondents to assign a level of importance to all of the sources they used. Overall, a number of key sources emerged, particularly environmental cues such as seeing smoke or water, or feeling the earthquake. Other important sources for respondents were radio, television, news and weather websites and other people via direct means, such as conversations face-to-face, on the phone or via text message. Newspapers emerged as the least important source across disasters. Table 5.24 provides the detailed information.

**Table 5.24 Most important sources for disaster-experienced respondents**

| Sources | No importance | Of little importance | Somewhat important | Very important | Most important |
|---|---|---|---|---|---|
| | % | % | % | % | % |
| **Environmental cues** | 0.0 | 7.0 | 16.7 | 36.8 | 39.5 |
| **Radio** | 3.5 | 7.9 | 17.5 | 31.6 | 39.5 |
| **Television** | 3.5 | 5.3 | 16.7 | 38.6 | 36.0 |
| **News or weather website** | 0.9 | 2.6 | 18.4 | 43.0 | 35.1 |
| **Direct contact other people** | 2.6 | 3.5 | 22.8 | 39.5 | 31.6 |
| **Agency message** | 3.5 | 11.4 | 20.2 | 35.1 | 29.8 |
| **Agency website** | 5.3 | 17.5 | 26.3 | 28.1 | 22.8 |
| **Agency contacts** | 7.9 | 14.9 | 24.6 | 31.6 | 21.1 |
| **Agency social media** | 7.0 | 22.8 | 28.9 | 24.6 | 16.7 |
| **Indirect contact other people** | 7.0 | 14.9 | 30.7 | 36.8 | 10.5 |
| **Newspaper** | 17.5 | 33.3 | 21.9 | 16.7 | 10.5 |

This is illustrated more clearly in Figure 5.6.

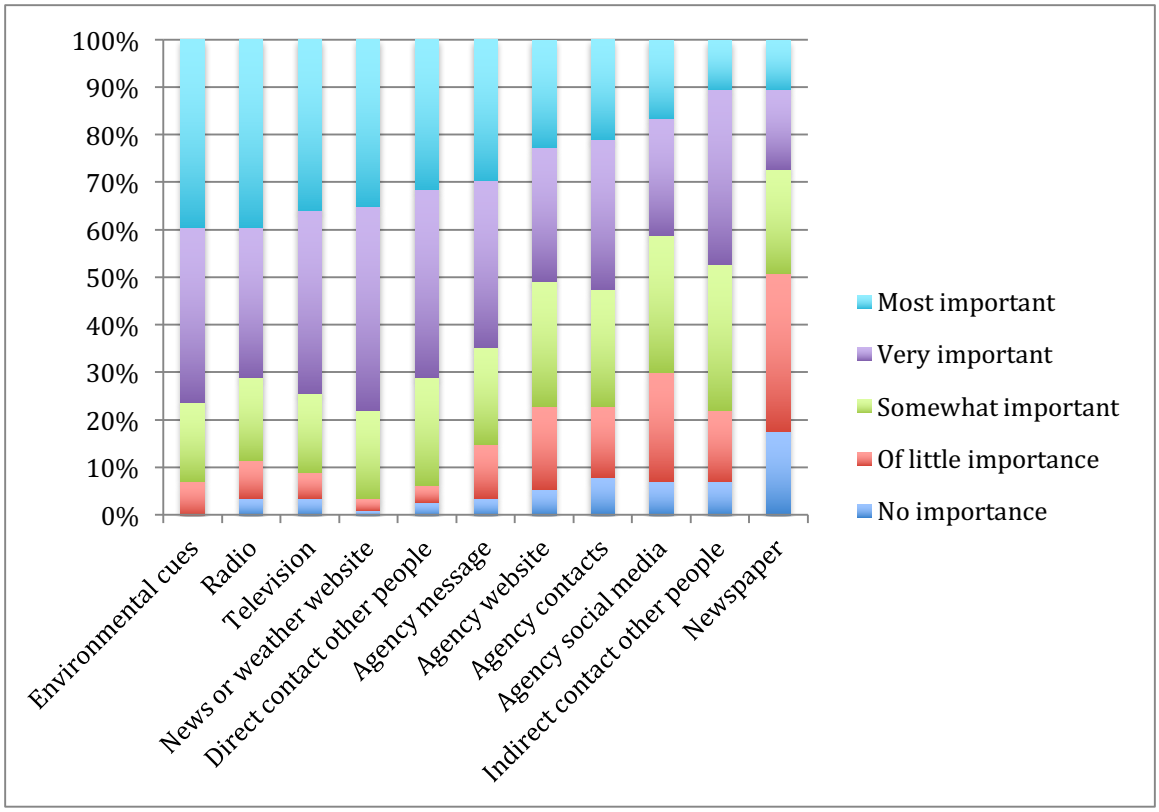



**Figure 5.6 Most important sources for disaster-experienced respondents**

In this sample of the disaster experienced respondents, the most important sources were, in order of importance: environmental cues, radio, television, news and weather websites, direct contact with other people face-to-face or by telephone using voice or text (internet phone options such as Skype were also included). Least important sources were newspaper, followed by indirect contact with other people such as email and social media, and agency social media. However, even these least important sources of information were reported as of some level of importance (most, very or somewhat) to the information seeking effort: 49.1% of disaster-experienced respondents (n = 105) considered newspaper to be most important, very important or somewhat important, while agency social media was considered by 70.2% (n = 91) to be of some degree of importance. In categorizing most important sources, newspaper was considered most important by 6.6% of disaster-experienced respondents (n = 9). Indirect contact with family, friends and neigbours, such as social media or email, was most important source for just 10.2% of the sample (n = 14). Almost all information sources are of some importance to people facing a disaster, except newspaper, which was of no importance to more than half the disaster-experienced respondents. Environmental cues were most consistently important as a source, with 93% of respondents reporting sight, smell, sound and feel to be

of at least some importance to them as a source of information. The most important sources were very similar to the first alert and confirmation sources for the overall sample, which were reported in Table 5.28. This section will now consider the most important sources for each disaster type.

### 5.3.5.1. Flash flood

Flash flood represented the largest disaster type reported by the sample (n = 94). The most important sources for people who were involved in a flash flood were television, others directly, news and weather websites, environmental cues and radio – which reflected the sources that appeared as first alerts and confirmation sources in the survey, but also as key sources in the interview phase of the study for flash flood. Interviewees reported that their first alerts were other people and environmental cues, confirmed by news and weather websites, but with the most useful source being television for a full picture of the event. The importance of the full range of sources is recorded in Figure 5.7.

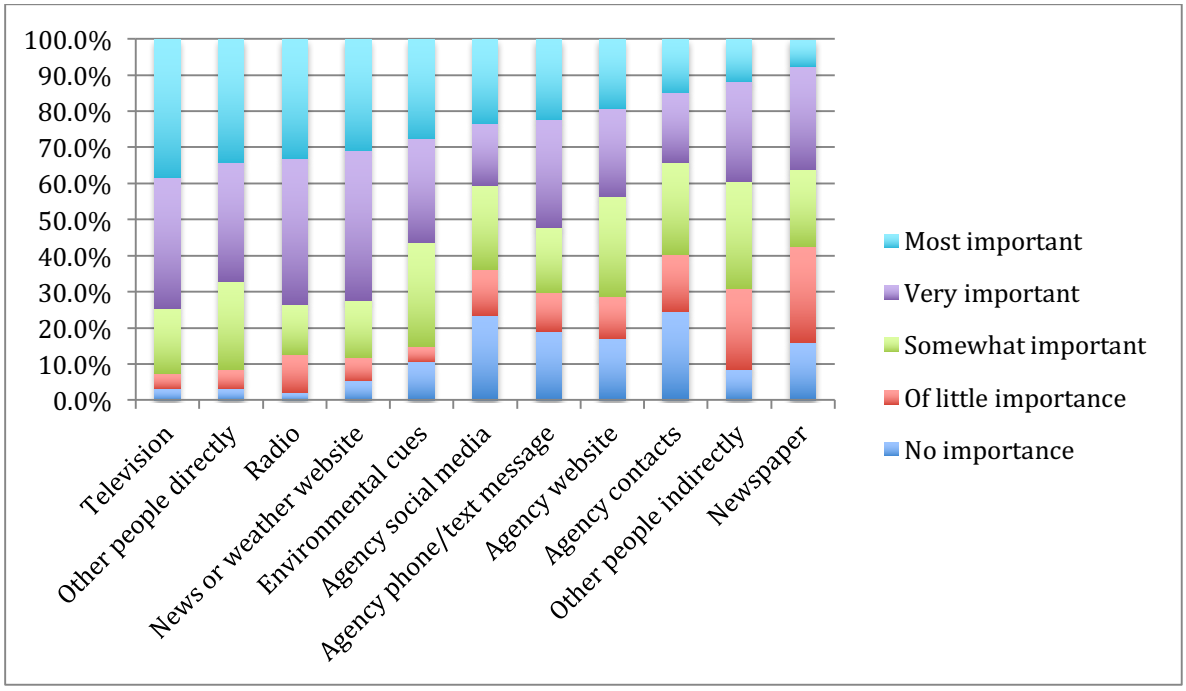



**Figure 5.7 Most important sources for those with experience in a flash flood**

### 5.3.5.2. Slow flood

Slow moving flood was the second most reported disaster with 42 respondents identifying this as the most recent disaster their community had experienced. The slow flood featured a bigger range of most important sources than the other disasters, with six nominated as most, very or of somewhat importance by more than 85 of slow flood experienced respondents. These were: news or weather website, radio, television, environmental cues, agency or local government website, and others directly. The interview phase also showed that slow flood respondents were more likely to use a wider range of sources than other disaster-experienced people, with the St George flood respondents using 5.38 source each. The most important sources recorded in the survey were consistent with the alert/confirmation/important sources in the interviews, and also with the alert and conformation sources reported by survey respondents. However, agency contacts featured more highly in both the interview and survey alert and confirmation stages than in the most important sources survey results. Figure 5.8 illustrates the detail.

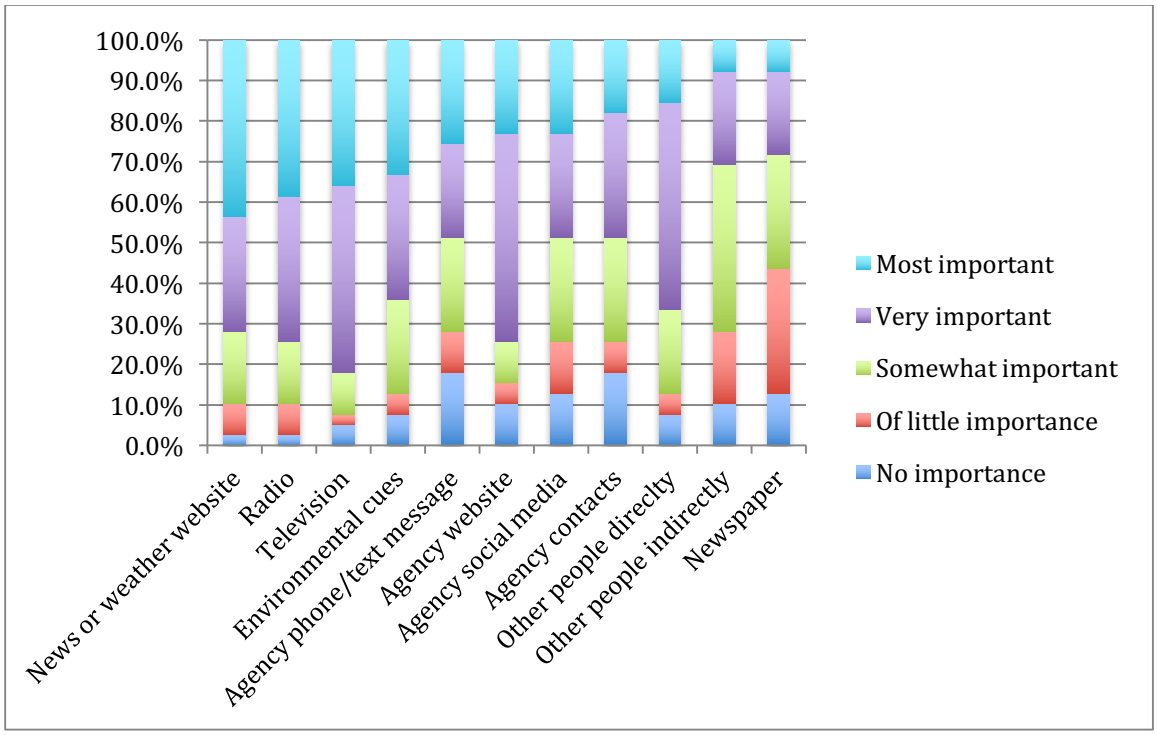



**Figure 5.8 Most important sources for those with experience in a slow flood**

### 5.3.5.3. Bushfire or wildfire

Bushfire information seeking behaviour was reported by 19 respondents. Most important sources were consistent with the alert/confirmation sources, with radio, environmental cues and others directly being of greatest importance. This was consistent also with the interviews, in which these three sources were most consistently used by all of the fire-experienced interviewees. F below, illustrates the importance of different sources. Television and newspaper were the least important, with newspaper not rated as 'most important' by any of the respondents.

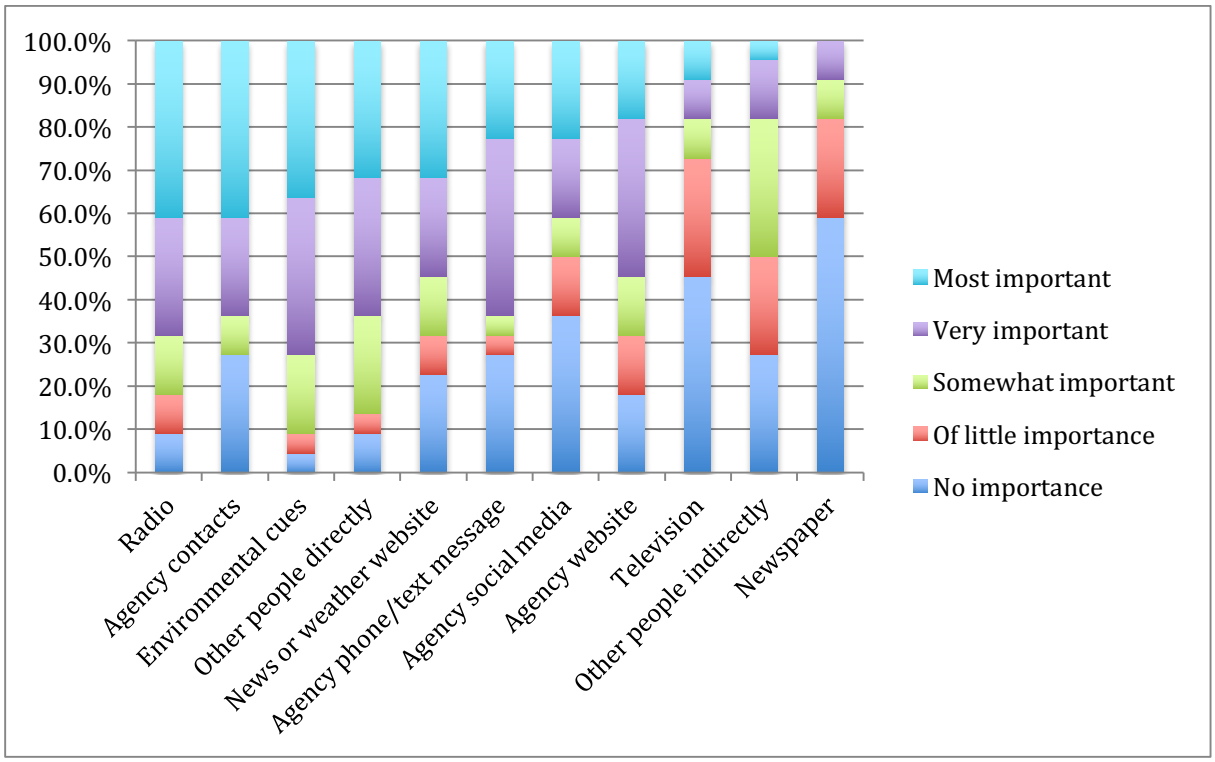



**Figure 5.9 The most important sources for those experienced in a bushfire or wildfire**

### 5.3.5.4. Cyclone

For the 31 respondents who answered the information behaviour questions in the survey, news and weather websites and radio were the most important sources, which 95% rated at least of some importance, while television was of importance for more than 90%. This reflects the interview findings, in which radio, the Bureau of Meteorology website, television and other people were both alert and confirmation sources. Figure 5.46 shows the importance ratings for cyclone for the various sources.

The graph in Figure 5.10 below shows the most important sources for those who experienced a cyclone, hurricane or typhoon.

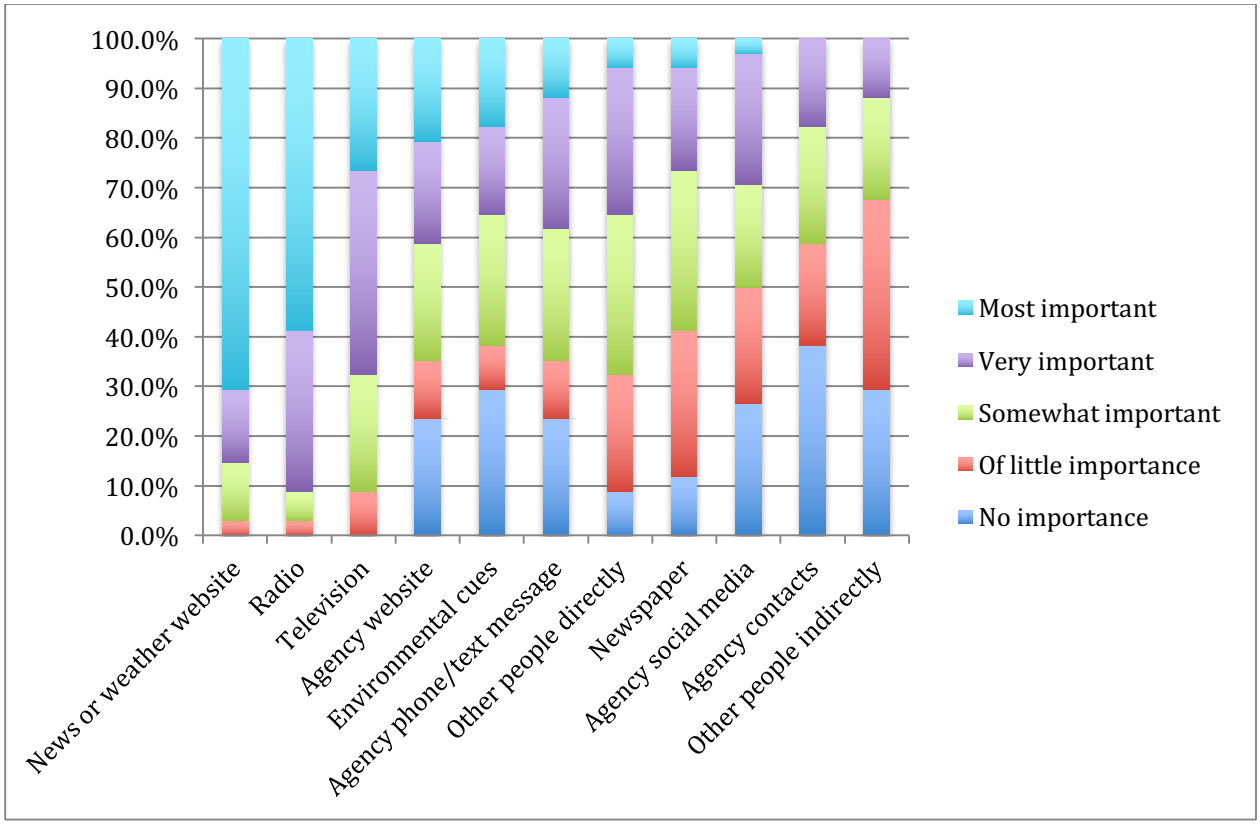



**Figure 5.10 The most important sources for those who experienced a cyclone, hurricane or typhoon**

### 5.3.5.5. Storm

Most important sources for storm respondents were environmental cues, others directly and television. This set of sources could indicate the sequence of the disaster whereby the sudden impact of the storm prompts use of the most immediate sources (visuals and people around them), with television becoming important after the storm to get a sense of the scale and nature of the disaster. The alert confirmation pathways for storm were other people then media, environmental cues, and radio then environmental cues, news and weather websites/agency websites and then other people. This indicates that the main sources will be a little different from the fist two sources in a storm – the first alert and the confirmation source do not often become the main source. This could be tested in future research. The details are included in Figure 5.11.

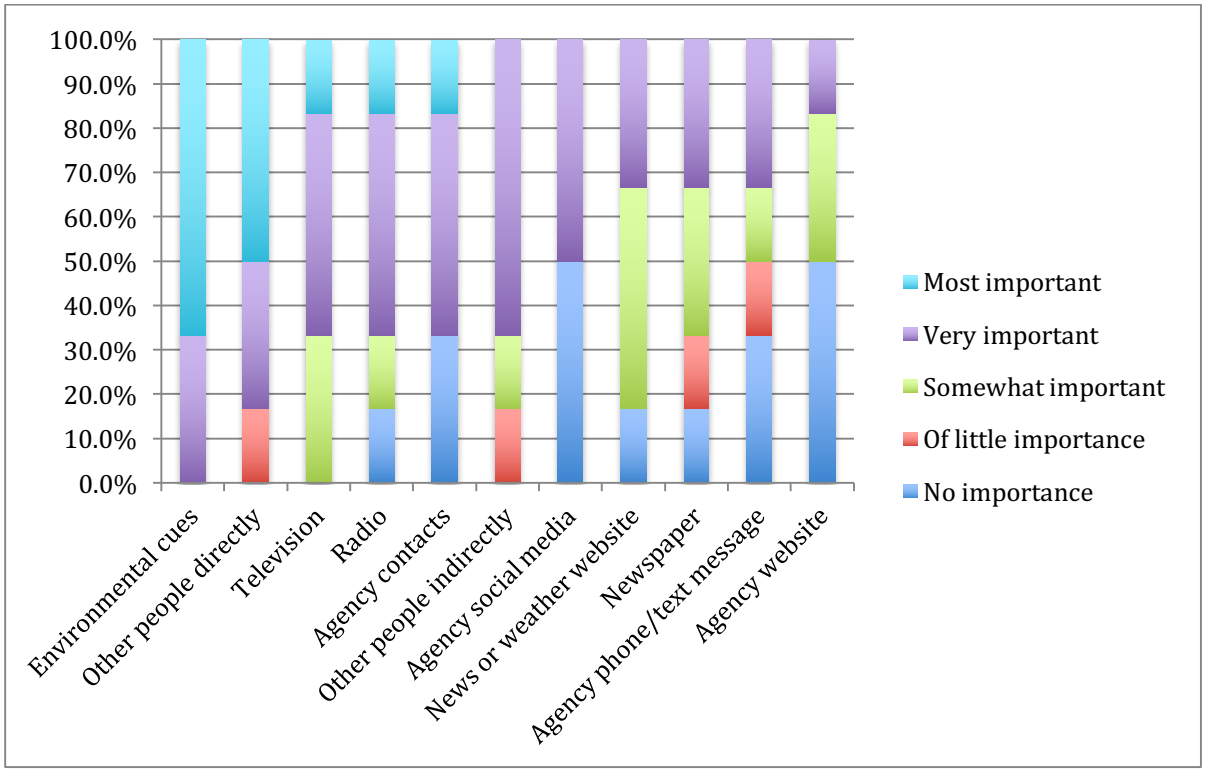



**Figure 5.11 The most important information sources for those who experienced a storm**

### 5.3.5.6. Tornado

Two people reported experience with a tornado, and their source preferences were for direct and indirect contact with other people, and environmental cues, and then of slightly less significance, radio. This might be a reflection of the urgency of the situation in which other people and sight and sound of the storm are immediately available, and radio could be a source consulted later in the tornado sequence. It could also be that radio is a more flexible medium, where programs can be interrupted for storm warnings more easily, therefore enabling more frequent updates. The most important source diverges from the alert/confirmation sources, which include television and news and weather websites. Figure 5.12 shows the most important sources for the two respondents.

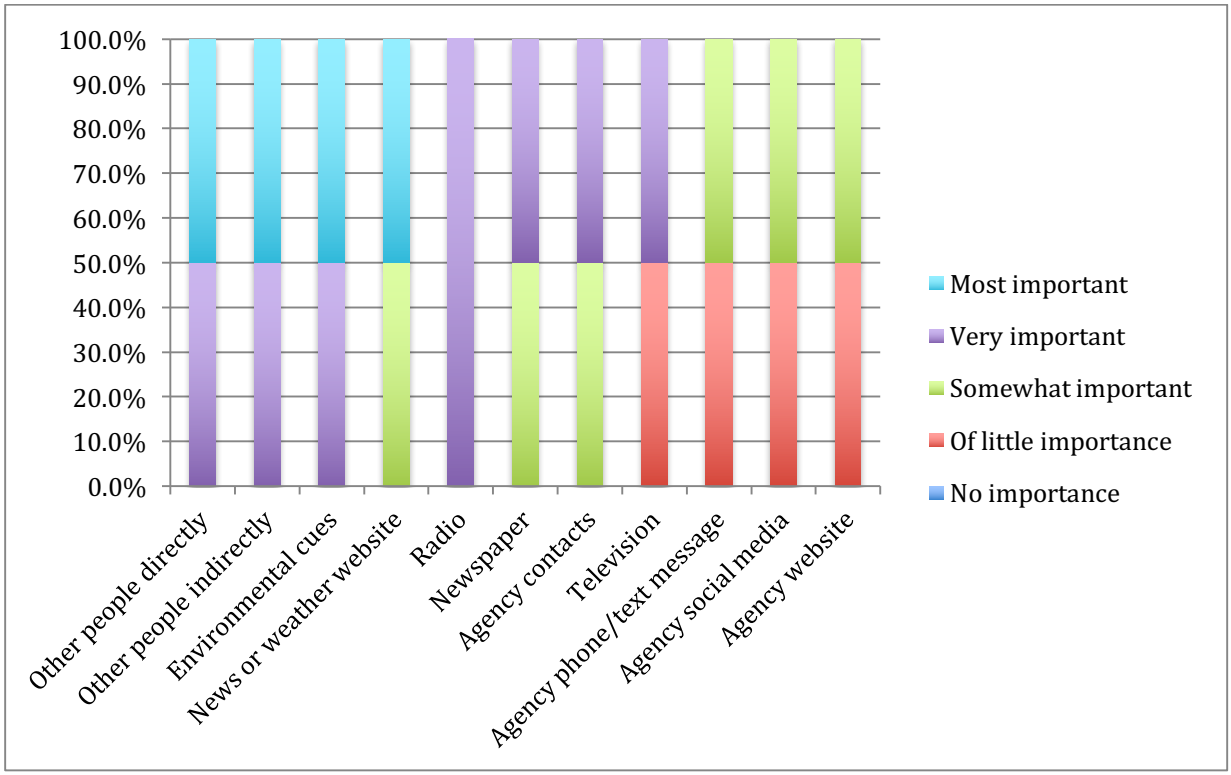



**Figure 5.12 Most important information sources for those who experienced a tornado**

### 5.3.5.7. Earthquake

Three people reported their most important sources during and after an earthquake, all triggered by environmental cues. Unlike the sudden storm, environmental cues remained an important source for earthquake survivors, but were supplemented by news from friends, family and neighbours by a variety of forms. Mainstream media was also of some importance, but behind other people in terms of significance. Figure 5.13 shows this more clearly.

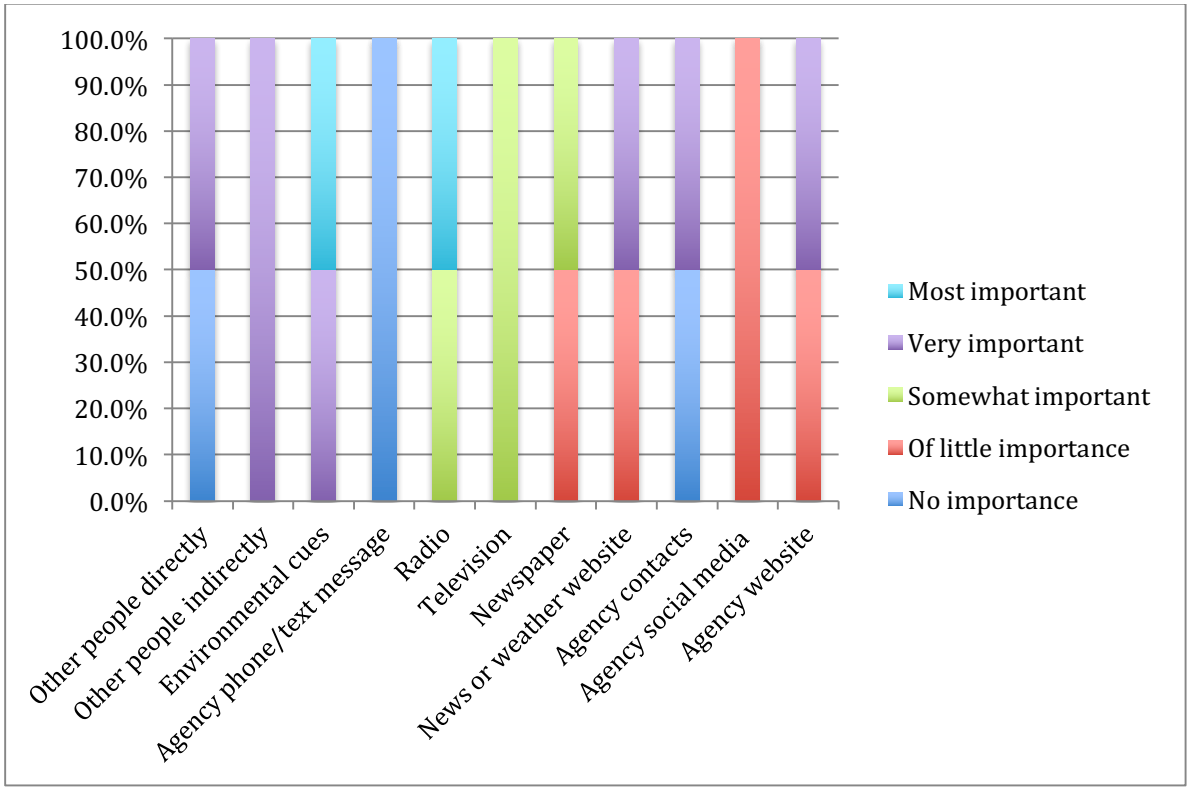



**Figure 5.13 The most important information sources for those who experienced an earthquake**

### 5.3.5.8. Tsunami

Two people reported they had experienced a tsunami and also reported a wide range of important sources. Most important were environmental cues, radio, other people directly and news or weather websites. This reflects the alert and confirmation sources, which were others directly, news and weather websites, radio and agency websites. Figure 5.14 below shows the most to least important sources for tsunami survivors.

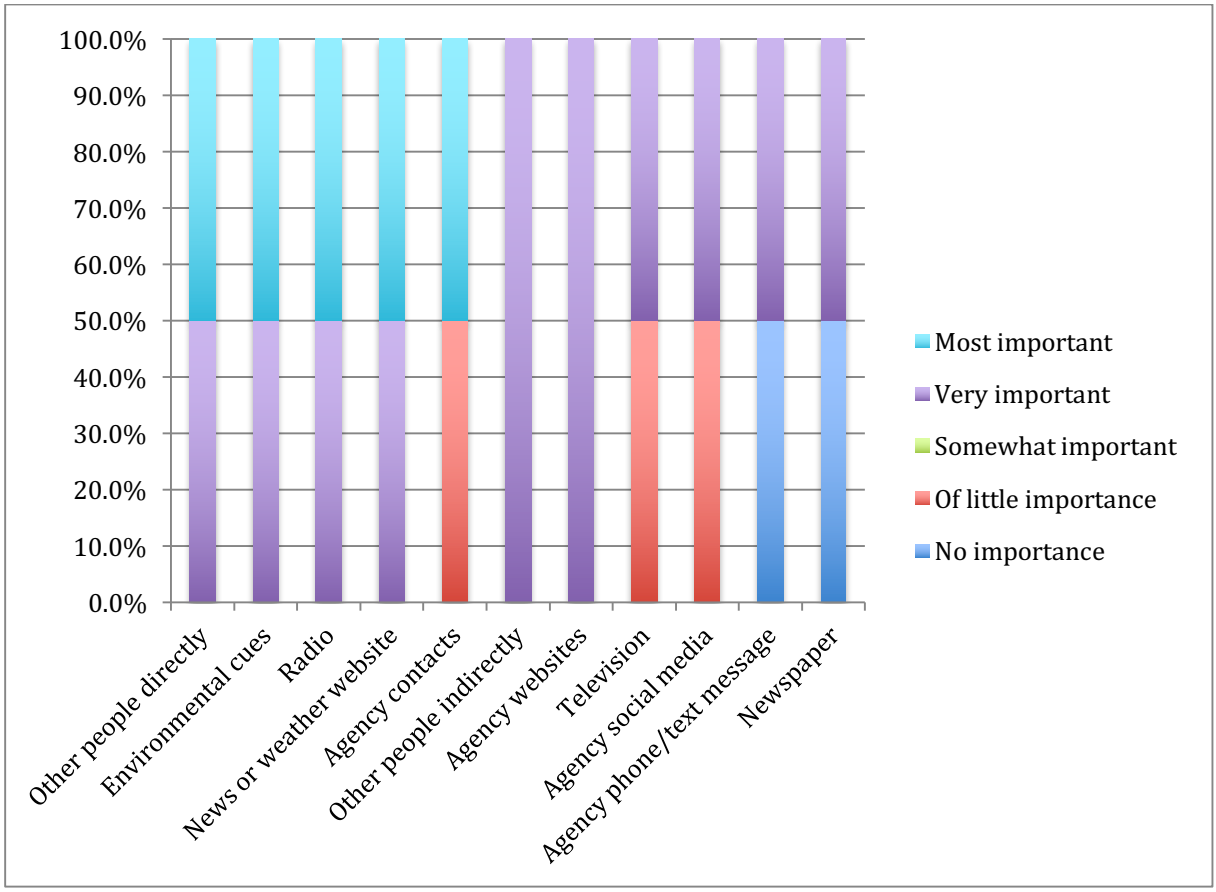



**Figure 5.14 Most important sources for those who experienced a tsunami**

### 5.3.5.9. Mudslide

One person recorded experience with a mudslide, and that person found that the most important information sources were all but others indirectly and agency social media. Figure 5.15 plots the responses of this respondent.

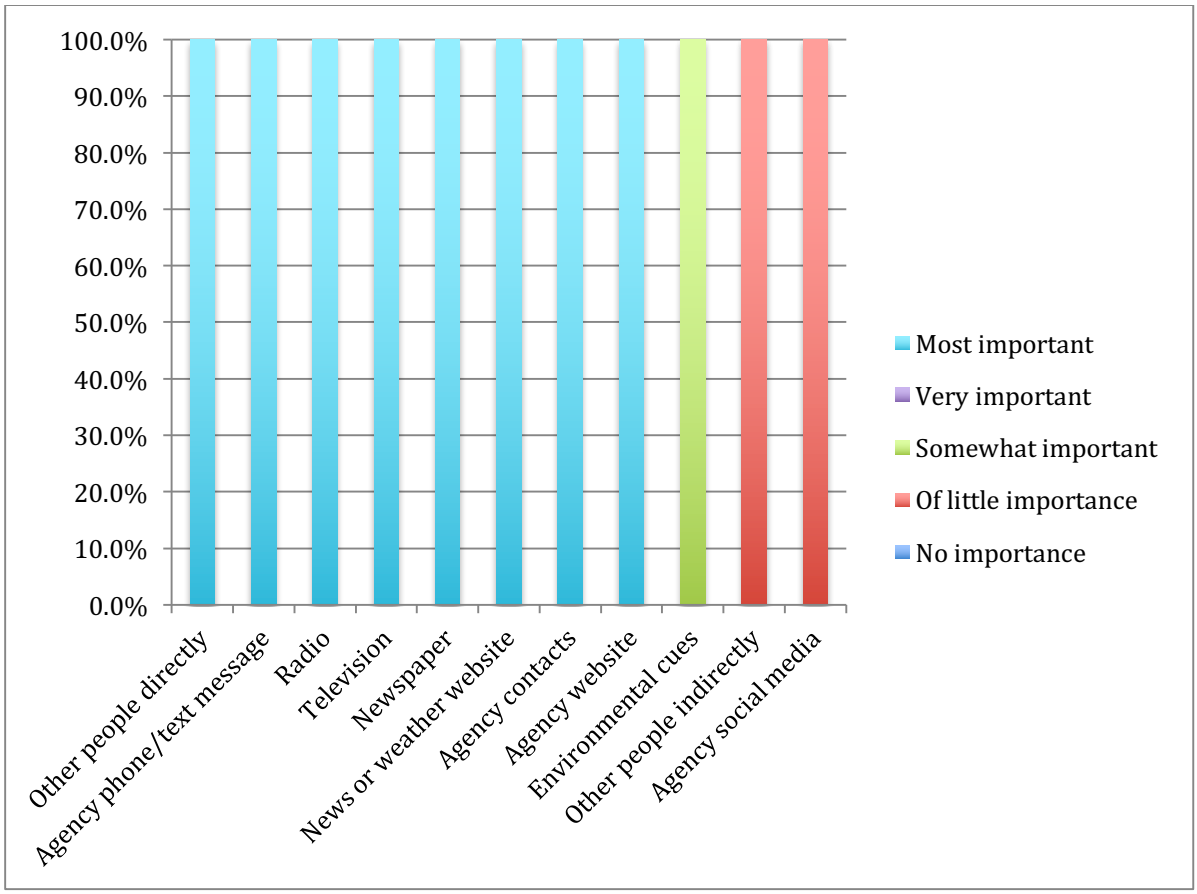



**Figure 5.15 Most important information sources for a person who was involved in a mudslide**

### 5.3.5.10. Most important sources summary

This survey data so far has shown a large number of information seeking behaviours, with commonalities revealed in the disaster types that had larger number of responses. Five predominant sources emerged across disaster types: environmental cues, particularly in disasters that covered a larger area such as slow flood and earthquake; other people via direct forms; news and weather websites; and mainstream media in radio and television. These sources and forms were prominent in alerts, confirmation and most important sources. Even

though some disaster types featured very low numbers, each information seeking pathway was important to this analysis. Future research on some of the more poorly represented disaster types should produce alternative, and perhaps from these representative, disaster information seeking pathways. The results reported in this chapter will be discussed further in Chapter 7 where the results of the entire study will be discussed.

### *5.3.6. Influences on source selection*

The previous sections reviewed the alert source. Before moving on to further source sequences, the influences on source selection will be reviewed, reflecting the importance of this disaster information seeking model component to post-alert information behaviour. The development of the disaster information seeking model in chapters 2 and 4 showed the potential for the characteristics of the message and the form it comes in, and the characteristics of the information seeker, to affect the source selection by that information seeker in the process of looking for information. The literature review showed that these characteristics included: the message features such as the source and form, consistency, accuracy, clarity, certainty, guidance and frequency; environmental cues; and characteristics of the information seeker such as social ties and social setting, their proximity to the disaster or their location generally, age, gender, education, race and ethnicity, resources, cognitive abilities, disaster experience and locus of control. The interviews showed that additional to these influences on source selection should be time (the pressures of time, the length of time of the disaster) and the presence of images, either in the form of photographs or footage, or seeing the disaster or its effects.

The survey included questions that related to some of these influences on source selection, but not all were covered because of the complexity of some of the influences, and the wide scope of others. Potential influences that could support simple questions, straightforward responses from respondents, and simple analysis were covered in the survey. These were age, gender, social ties (via household composition questions), proximity (via the question on evacuation), education, resources (via the income question), disaster experience and time (time it took for them to seek further information after receiving an alert). Even these questions did not provide a solid basis for conclusions, but as that was not the aim of the survey, the use of the questions as guidance was considered acceptable for this study. The remaining information seeker characteristics,

which would require many questions for each factor and then complex analysis to determine their presence, were left out of the survey stage. These included race/ethnicity, cognitive abilities and locus of control. This decision helped keep the thesis within a manageable scope. The characteristics of the message and the form it was sent in were also not included in the survey investigation. This was also to keep an already long survey manageable. These more complex issues can be explored in future research. Each of the potential influences on source selection will be explored from this point, in this order: age, gender, proximity and location, social ties, education, and income. In all cases, the responses of experienced respondents will be used, and where appropriate, compared with those with no experience.

#### 5.3.6.1. Age

In the literature review, age was shown to affect a number of aspects of disaster behaviour and information seeking as a subset of this behaviour. The age of a person was linked to levels of disaster preparation (Sorensen 1991), trust in different forms and sources (Piotrowski & Armstrong 1998; Sattler, Kaiser & Hittner 2000), evacuation compliance (Trumbo et al. 2011), disaster knowledge (Kuppuswamy 2014), concern about terrorist attacks (Drabek 1999) and media use in a disaster that is not close by (Greenberg, Hofschire & Lachlan 2002). Age as an influence on source selection was not explored in depth in the interviews because of the small samples and the preoccupation with exploring the range of possible behaviours rather than effects on this behaviour. The larger sample and different aims of the survey make investigation of the potential influence of age possible. The data from disaster-experienced respondents will be the sample examined here.

**Age and alert sources**

The survey showed that there were differences in alert sources across each age group in the disaster experienced respondents. The chart in Figure 5.16 illustrates the age groups and their alert sources by percentage of people from each age group. Each age group is explained further into this section.

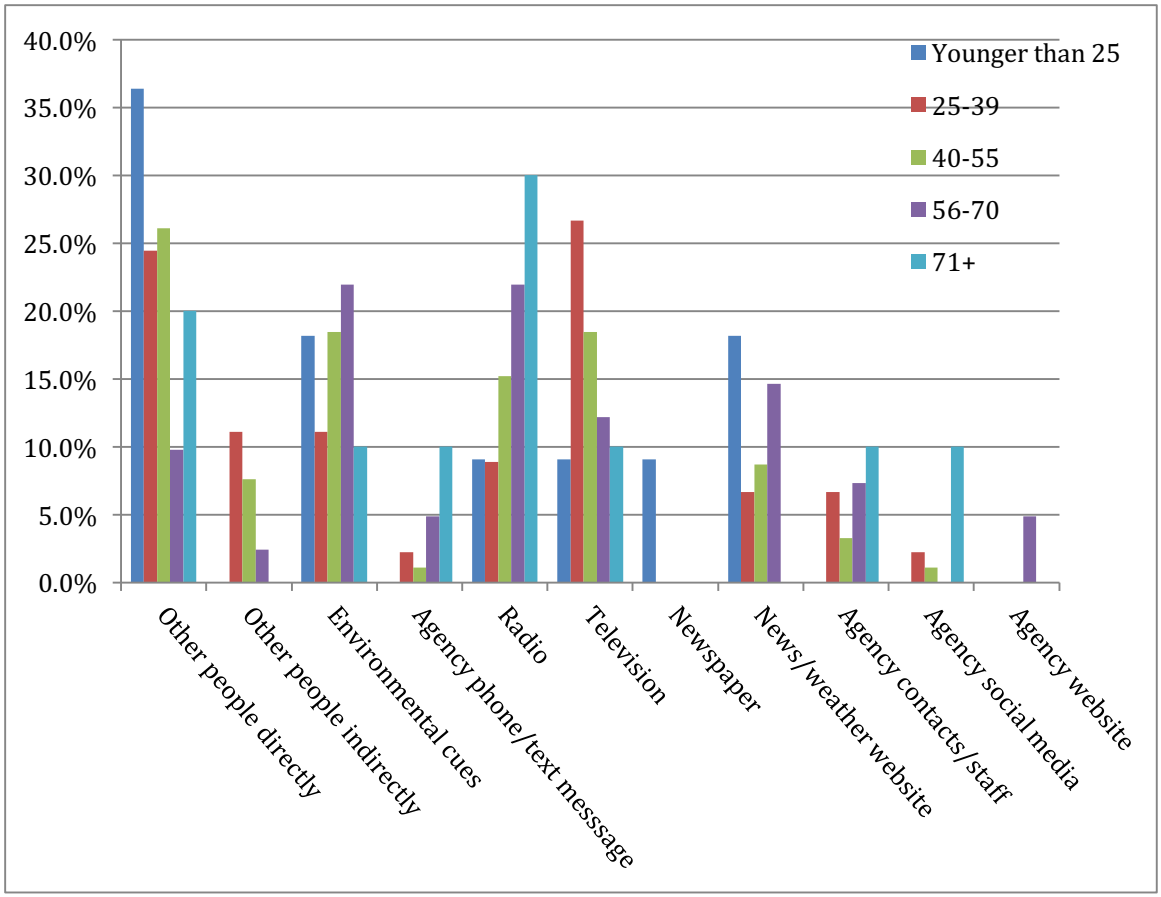



**Figure 5.16 The alert sources of different age groups**

**Under 25s (n=11):** Other people directly was the most often experienced alert source for the under 25s, with 36.4% of the disaster experienced respondents in this age group reporting finding out about a disaster from other people. The other main alert sources were environmental cues and news/weather websites (18.2% of this age group for each alert source). Five alert sources indicated a lack of spread across the alert sources for young people, which could be a result of the small size of this age group (n=11). The next smallest group, 71+ with 14 respondents, used seven of the 11 possible alert sources. None of the Under 25s identified agency messages, others indirectly, agency contacts or staff agency social media or agency websites as their alert sources. The surprise in this result is the lack of any social media presence in the Under 25s alert profile, which would have emerged in the others indirectly or the agency social media options provided in the survey.

**25-39 (n=45):** This age group learned about the disaster from a larger range of sources than the Under 25s, with only newspaper and agency websites missing from this alert profile. The most prevalent alert source was television (26.7% of this age group), other people directly (24.4%), then environmental cues and

others indirectly (11.1%). Radio was the next most-often reported confirmation source with 8.9% of the group's sample.

**40-55 (n=92):** The 40-55 group was the largest age group recorded in the survey. Like the 25-39s, people in this age group did not get their alert from agency websites or newspapers, but had a very similar alert profile to the Under 25s. Their most prevalent first alert was other people directly (26.1% of the age group), followed by environmental cues and television (18.5% each), then radio (15.2%) and news or weather websites (8.7%).

**56-70 (n= 41):** This age group had a very different alert profile to the other three groups, with environmental cues and radio being the most often occurring alert sources (22% each). News or weather websites featured more highly as an alert source for this group than most other groups (14.6%), followed by television (12.2%) and then other people directly (9.8%). Agency websites and newspapers were not alert sources in this profile.

**71+ (n=10):** The alert profile of this age group was interesting for its wide spread of sources across a small group or respondents. The main alert sources were radio (30% of the age group), other people directly (20%), and environmental cues, agency messages, television, agency contacts and agency social media alert sources (10% each). The sources that did not feature in this profile were newspaper, others indirectly, news or weather websites, or agency websites. The interesting point about this profile is the presence of agency social media as an alert source in this profile – only three people across all age groups heard about the disaster from this source, and a member of the elder age group, the least likely to be on social media (Australian Bureau of Statistics 2014), was one of them.

**Overall observations:** There were notable differences between the two older age groups and the three youngest in terms of the tendency for people older than 56 to hear of a disaster via radio. Older people were also the only groups to learn about a disaster from agency websites. The 56-70 years group reported the lowest incidence of finding out about a disaster from other people directly, with the other four ages reporting a strong incidence of finding out via this source. Newspaper was an alert source for only one person, and surprisingly, this person was from the Under 25 group. In addition, it was surprising given that 90% of 15-

24 year old Australians on the internet use social media (Australian Bureau of Statistics 2014), none of the 11 respondents aged under 25 that responded reported finding out about the disaster via social media. The youngest age group also reported the smallest range of alert sources. Table 5.25 provides the detailed data showing the alert sources for each age group.

**Table 5.25 Alert source by age group**

| First alert | Alert source by disaster experience by age | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Younger than 25 | | 25-39 | | 40-55 | | 56-70 | | 71+ | | **Total alert source** | |
| | N | % | N | % | N | % | N | % | N | % | **N** | **%** |
| **Other people directly** | 4 | 36.4 | 11 | 24.4 | 24 | 26.1 | 4 | 9.8 | 2 | 20.0 | **45** | **22.6** |
| **Other people indirectly** | 0 | 0.0 | 5 | 11.1 | 7 | 7.6 | 1 | 2.4 | 0 | 0.0 | **13** | **6.5** |
| **Environmental cues** | 2 | 18.2 | 5 | 11.1 | 17 | 18.5 | 9 | 22.0 | 1 | 10.0 | **34** | **17.1** |
| **Agency text/phone message** | 0 | 0.0 | 1 | 2.2 | 1 | 1.1 | 2 | 4.9 | 1 | 10.0 | **5** | **2.5** |
| **Radio** | 1 | 9.1 | 4 | 8.9 | 14 | 15.2 | 9 | 22.0 | 3 | 30.0 | **31** | **15.6** |
| **Television** | 1 | 9.1 | 12 | 26.7 | 17 | 18.5 | 5 | 12.2 | 1 | 10.0 | **36** | **18.1** |
| **Newspaper** | 1 | 9.1 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | **1** | **.5** |
| **News or weather website** | 2 | 18.2 | 3 | 6.7 | 8 | 8.7 | 6 | 14.6 | 0 | 0.0 | **19** | **9.5** |
| **Contacts in agencies** | 0 | 0.0 | 3 | 6.7 | 3 | 3.3 | 3 | 7.3 | 1 | 10.0 | **10** | **5.0** |
| **Agency social media** | 0 | 0.0 | 1 | 2.2 | 1 | 1.1 | 0 | 0.0 | 1 | 10.0 | **3** | **1.5** |
| **Agency website** | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 2 | 4.9 | 0 | 0.0 | **2** | **1.0** |
| **Total age group** | **11** | **100** | **45** | **100** | **92** | **100** | **41** | **100** | **10** | **100** | **199** | **100** |

### Age and confirmation sources

The next step was to review the information on confirmation sources and age groups in a similar way to the alert source. Figure 5.17 charts the confirmation sources for each age group of disaster-experienced survey respondents.

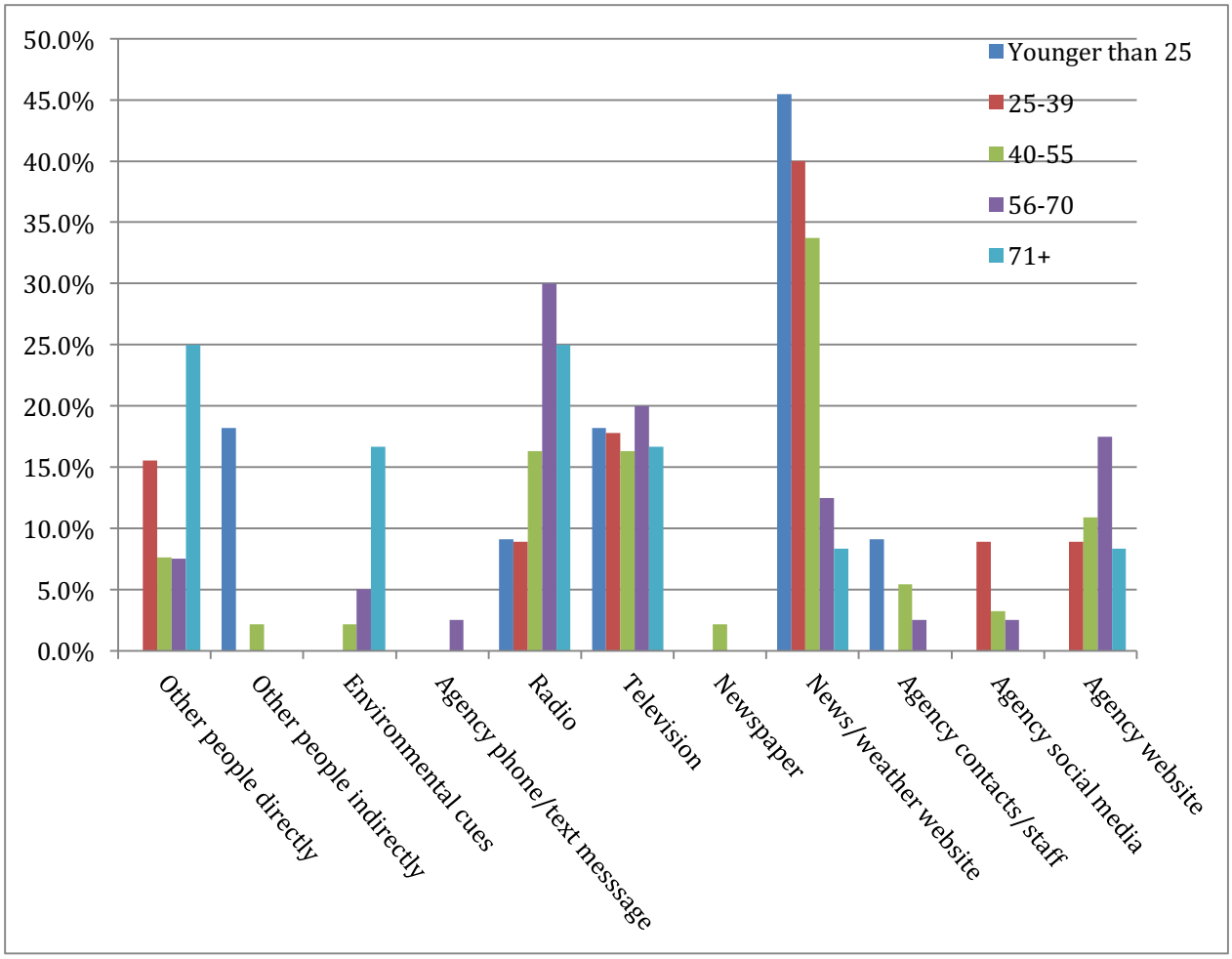



**Figure 5.17 Confirmation sources of different age groups**

**Under 25s (n=11):** The predominant confirmation source for young people was the web, specifically news or weather websites, with almost half of that age group (45.5%) turning to this source to find out more about the disaster. Other confirmation sources were other people by email or social media, and television (18.2% each) and radio and agency contacts or face-to-face contact with an agency person (9.1% each). Again, the number of sources accessed for this stage of the information seeking process was low for this age group – they did not talk to other people directly, access environmental cues such as check for smoke, damage or rain, use a newspaper, or access agency social media or websites for more information. A sixth option that was provided in the survey but not used by this age group was agency phone or text messages, which at the time of the interview was predominantly used by agencies as a warning, rather than an update service, so it was expected that this would not be a popular confirmation source across all of the age groups. In all, just five information sources were accessed by respondents in this group.

**25-39 (n=45):** Like the Under 25s, this age group mostly turned to news and weather websites for more information, with 40% of the group using this source. Television was the next most popular confirmation source (17.8% of the group), then other people directly (15.6%). Other sources were radio, emergency agency media and emergency agency social media (8.9% each), demonstrating use of a wider array of online sources than the Under 25s. Online sources were used by a total of 59.8% of respondents in this age group. Four sources were not used by this group: agency phone or text message, other people indirectly, environmental cues, and newspapers.

**40-55 (n=92):** This age group was also online-oriented, with the most popular confirmation source for this age group being news and weather websites (33.7%). However, mainstream media was important, with radio and television the second most prevalent confirmation sources (16.3% each). After radio and television were agency websites (10.9%) and other people directly (7.6%). Adding use of emergency agency social media (3.3%), the total online confirmation sources were 47.9% for this age group. The agency phone/text message was the only source not used for more information by this group – the 'push' nature of this source might account for this.

**56-70 (n=40):** As expected with this age group from the literature review, radio and television were the predominant confirmation sources, with radio the choice of 30% of the age group and television chosen by 20%. However, this group was the biggest user of emergency agency websites for more information on a disaster (17.5%). News and weather websites were used by 12.5% of the group to find out more. Other people directly were also useful source for this group (7.5%). Two sources were not identified as a confirmation source for this group: other people indirectly and newspapers.

**71+ (n=12):** As with the alert source, the oldest age group reflected the youngest in the smaller range of sources used by respondents but the most popular sources reflected the traditional alert sources identified for this group in the previous section. Other people directly and radio were most often identified (25%). Television and environmental cues played an important role in the confirmation stage for 16.7% of this group. However, internet was also a confirmation source for one sixth of this group, with 8.3% each turning to a news or weather website or an agency website for more information. Five sources were not accessed by

this group: other people indirectly, agency phone/text message, newspaper, agency contacts or face-to-face contact with staff, and emergency agency social media.

**Overall observations:** Combined with the alert source data, a trend is emerging with the youngest and oldest groups tending to stick with a small range of sources for information seeking. Young people tended to use online sources, television and networked sources. Older people used traditional sources such as other people directly and radio, television and environmental cues. Older age groups were surprisingly online for their search for more information, with more than 50% of the 40-55 age group searching online, and almost 50% of the 56-70 age group. Again, social media was not as prevalent as expected in the Under 25s – just 18.2% of this group used other people indirectly (which could also mean connection by text) and did not use agency social media at all. Table 5.26 provides the detailed data for this discussion.

**Table 5.26 Confirmation source by age**

| Confirmation source by disaster experience by age | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Confirmation source* | Younger than 25 | | 25-39 | | 40-55 | | 56-70 | | 71+ | | **Total confirmation source** | |
| | N | % | N | % | N | % | N | % | N | % | **N** | **%** |
| **Other people directly** | 0 | 0.0 | 7 | 15.6 | 7 | 7.6 | 3 | 7.5 | 3 | 25.0 | **20** | **10.** |
| **Other people indirectly** | 2 | 18.2 | 0 | 0.0 | 2 | 2.2 | 0 | 0.0 | 0 | 0.0 | **4** | **2.0** |
| **Environmental cues** | 0 | 0.0 | 0 | 0.0 | 2 | 2.2 | 2 | 5.0 | 2 | 16.7 | **6** | **3.0** |
| **Agency text/phone message** | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 2.5 | 0 | 0.0 | **1** | **0.5** |
| **Radio** | 1 | 9.1 | 4 | 8.9 | 15 | 16.3 | 12 | 30.0 | 3 | 25.0 | **35** | **17.5** |
| **Television** | 2 | 18.2 | 8 | 17.8 | 15 | 16.3 | 8 | 20.0 | 2 | 16.7 | **35** | **17.5** |
| **Newspaper** | 0 | 0.0 | 0 | 0.0 | 2 | 2.2 | 0 | 0.0 | 0 | 0.0 | **2** | **1.0** |
| **News/weather website** | 5 | 45.5 | 18 | 40.0 | 31 | 33.7 | 5 | 12.5 | 1 | 8.3 | **60** | **30.0** |
| **Agency contacts/staff** | 1 | 9.1 | 0 | 0.0 | 5 | 5.4 | 1 | 2.5 | 0 | 0.0 | **7** | **3.5** |
| **Emergency agency social media** | 0 | 0.0 | 4 | 8.9 | 3 | 3.3 | 1 | 2.5 | 0 | 0.0 | **8** | **4.0** |
| **Emergency agency or local government website** | 0 | 0.0 | 4 | 8.9 | 10 | 10.9 | 7 | 17.5 | 1 | 8.3 | **22** | **11.0** |
| **Total age group** | **11** | **100** | **45** | **100** | **92** | **100** | **40** | **100** | **12** | **100** | **200** | **100** |

### Age and main sources

The sources that people regarded as their most important during the disaster were also investigated in the survey. Survey respondents plotted the importance of each source on a five-point Likert scale, from 1 (no importance) through 'of little importance', 'somewhat important', 'very important' to 5 (most important). This section will look at each of the sources by age group to draw out patterns in selections and differences and similarities between the groups.

**Under 25s (n=10):** The Under 25 age group may have used a narrow range of sources to confirm the news of the disaster, but they widened their range of sources for the overall information search. While only four sources – news and weather websites, television, radio and environmental cues - were of most to some importance to all of the respondents in this age group, the other seven source options were also of at least some importance most of the group. Even newspaper, which did not feature in either the alert or confirmation sources for this group, was considered an important source for all but one respondent, and was ranked fifth after environmental cues in terms of importance. Two

interesting features of this small sample of data was the failure of any of the respondents from this group to identify as most important either of the social media sources, which were agency social media and others indirectly.

The other interesting feature of this age group was the relatively ambivalent attitude toward most sources. The respondents were sparing in their classification of sources as most important compared with the other age groups, and the classification of 'somewhat important' was used more extensively than by the other age groups. News and weather websites received the 'most important' endorsement from five respondents, television was most important for three people and the remaining even sources with a most important classification received this from two or fewer people from the group. Figure 5.18 illustrates the way the Under 25s classified their disaster information sources.

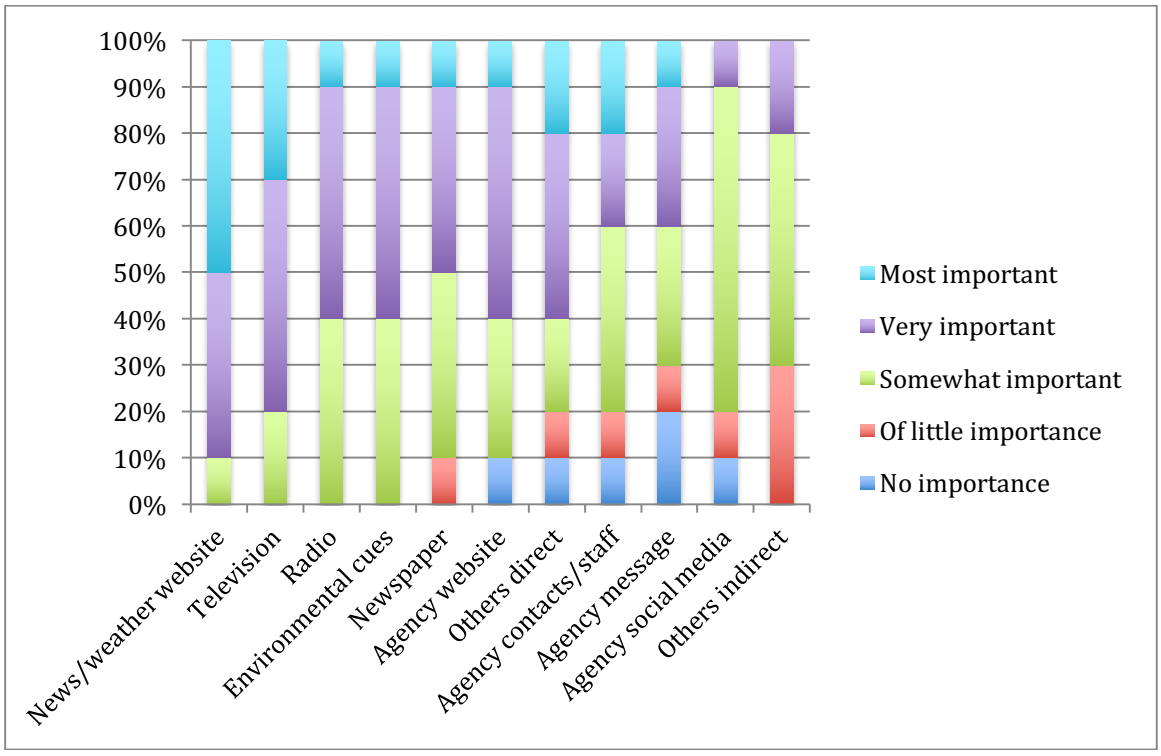



**Figure 5.18 Importance of sources for the Under 25 age group**

**25-39 (n=46):** The most important sources for this group mostly reflected the confirmation sources that they used: news and weather websites and television were most important, then radio and other people directly. Those who indicated that a source was useful generally found the source more useful than the Under 25 group, which is indicated by the depth of the blue and purple bands, the most

important and very important classification. However, more people in this group found sources of little or no importance, making their source selections more narrow than the Under 25s. While the Under 25s ranked newspaper as a more useful source, with the 25-39 group it was the least important source, but showing a higher level of usage than in the confirmation stage. The agency message could have a relatively low level of importance because people did not encounter it, rather than this source not being useful. Agency websites and social media were named as relatively important sources. The graph in Figure 5.19 shows the importance profile of the 25-39 age group's sources of information.

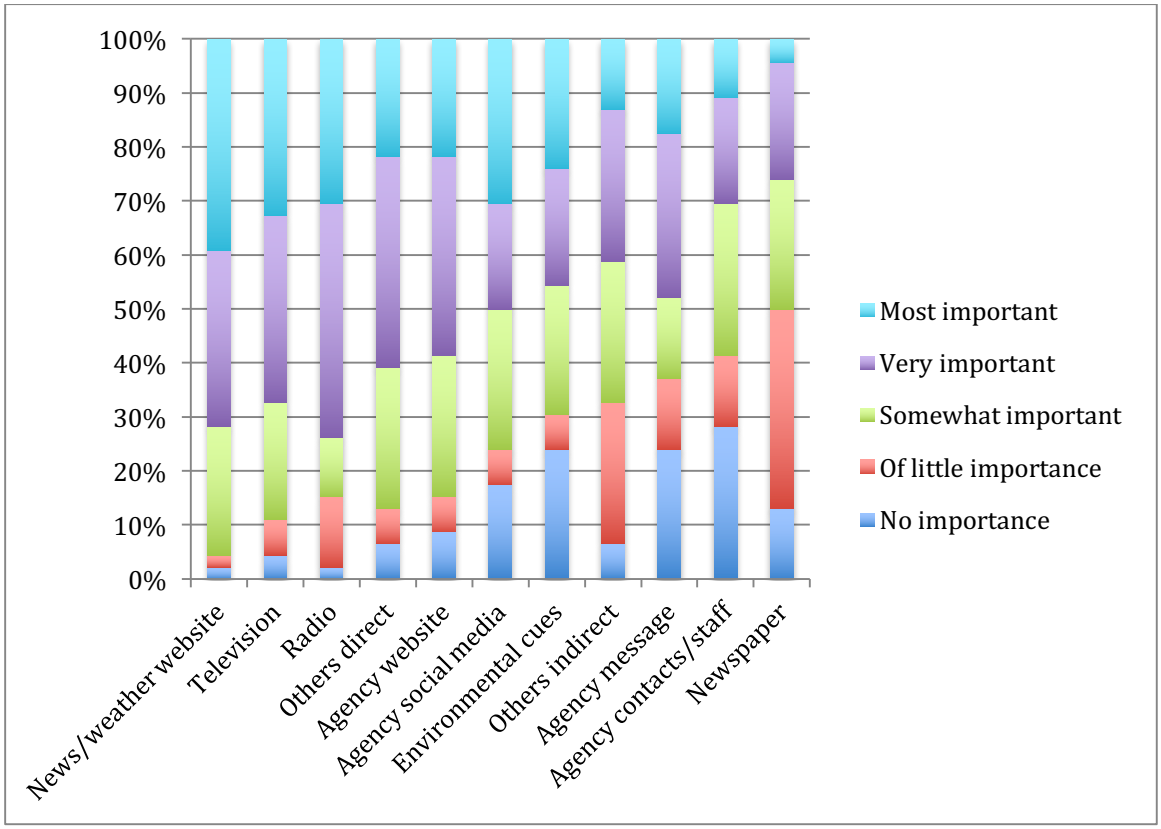



**Figure 5.19 Important sources for the 25-39 age group**

**40-55 (n=91):** This dataset shows that as people get older they find that fewer sources are important in their information search, and this is confirmed in the other two older age groups. This is shown on the right hand side of the graph where four sources were of little or no use to between 40% and 50% of the respondents, and a further two were of no use to more than 30% of the subsample. The most important sources were similar to the Under 25s and the 25-39 year olds, and also similar to their confirmation sources, although in a slightly

different order. Where this age group was more likely to confirm the disaster online, mainstream media became their main source, with online an important part of the top four sources cluster. This group tended to find more sources most important or very important, committing more strongly than the Under 25s to information sources. For instance, the first five important sources for this group were of at least some importance to 85% of the subsample. Six sources were of little or no importance to at least 36% of the sample. Even the most important sources across the group such as news and weather websites and television were registered as of little or no importance to a small number of respondents. Figure 5.20, below, provides a picture of the profile of importance of this group's information sources.

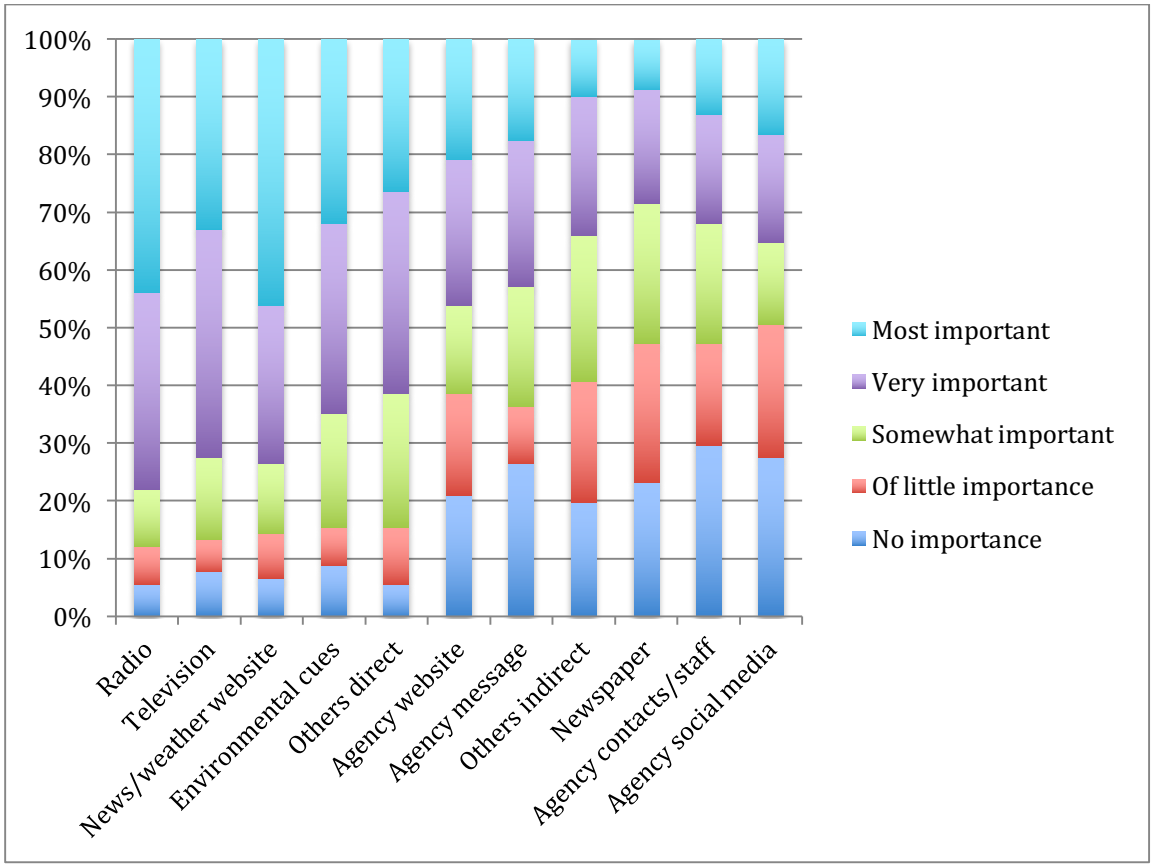



**Figure 5.20 Important sources for the 40-55 age group**

**56-70 (n=39):** The feature of this group was the emergence of other people directly as a source of some importance for 90% of the group. While other people directly had featured as a prominent source in the alert and confirmation stages for many of the age groups, it was lower on the scale than online sources, mainstream media and environmental cues. The other feature was the consistent reluctance of this group to classify a source as of no importance. The other group

that took this approach was the Under 25s, who ranked just five sources of no importance. While the 56-70 age group ranked more sources as of no importance to them, the number of people classifying sources with this ranking was much lower than in the 25-39 and 40-55 age groups. The most important sources were quite different to the confirmation sources for this group, which were radio and television, and news and weather websites. Television dropped in its ranking, but was still quite similar in importance to the fourth most important source, news and weather websites. This group was less likely to find newspapers of any importance than the previous three groups. The graphic representation of the data for this group is presented below in Figure 5.21.

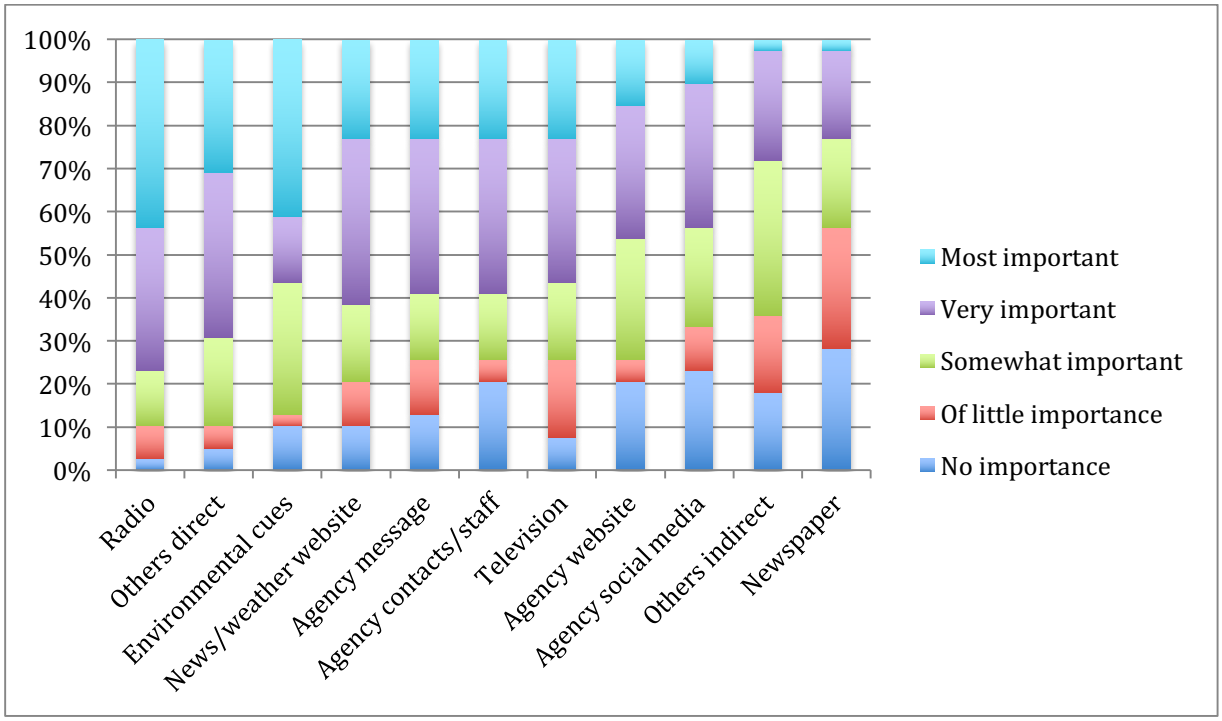



**Figure 5.21 Important sources for the 56-70 age group**

**71+ (n=11):** This group presented the most inconsistent data of all the groups and was also more likely than the other groups to find a source of little or no importance. However, the respondents from this age group were more likely than any of the other groups to identify a source as most important – only newspapers and other people indirectly were low or did not register on this scale. One source, radio, was the only source in the study to register more than 50% of respondents as a most important source, and three other sources – television, agency messages, and news and weather websites - were most important sources for between 45% and 50% of the subsample. This was the case for only radio in the 56-70 age group, radio and news and weather websites for the 40-55 age group, none for the 25-39 age group and news and weather websites for the Under 25s. While other people directly featured as an often-identified confirmation source for this group, it was not as important as radio, environmental cues, television, agency messages and news and weather websites for older people. Figure 5.22, below, illustrates these points.

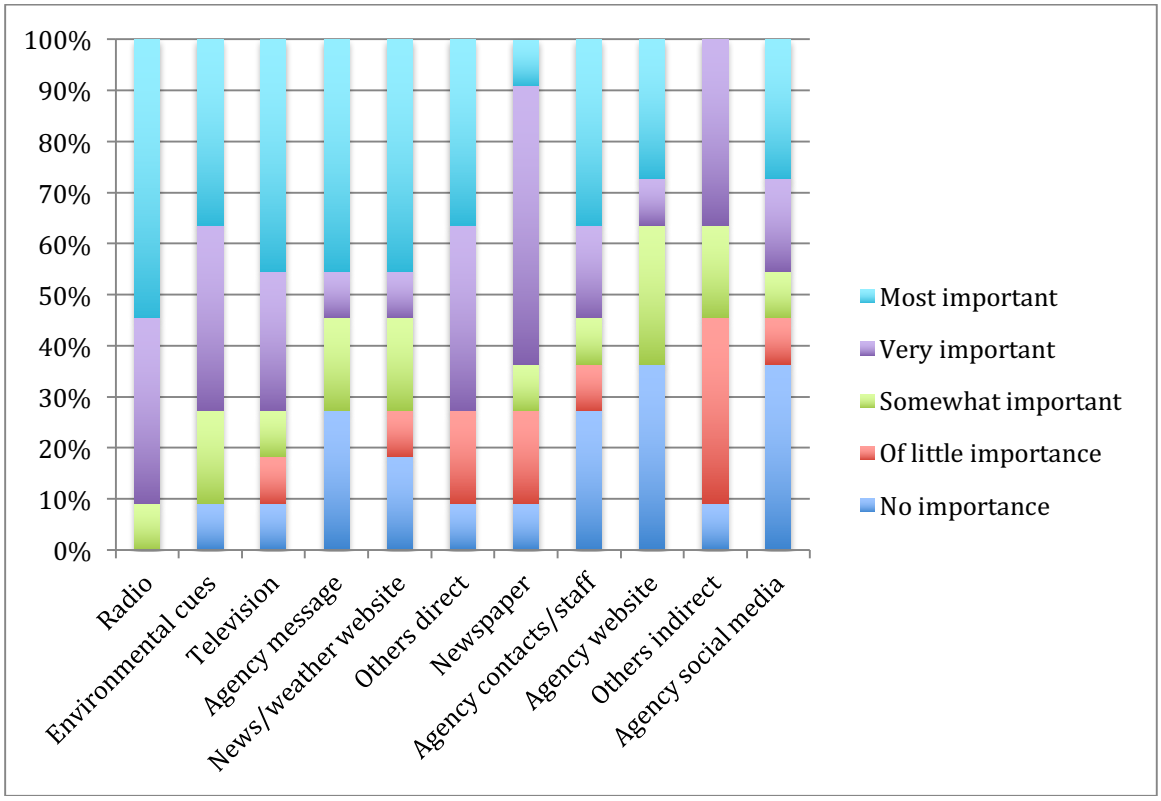



**Figure 5.22 Important sources for the 71+ age group**

**Overall observations:** The Under 25s used a wider range of sources than was evident in the alert and confirmation stages, and while their favourite source was news and weather websites, the online presence did not translate to social media, either official sites or contact with others in their social network. They were also ambivalent about the importance of their sources – most sources were somewhat or very important, with few classified as most important. Newspaper was quite an important source to this age group compared with the other age groups. As people got older, they found fewer sources were important, but attributed greater importance to these sources. However, it was only in the Under 25s and the 71+ age groups that people found any sources completely useful, with no classifications against these sources of little or no importance. The two older age groups were more likely to rely on traditional media, although news and weather websites featured highly across all of the age groups.

**Age as an influence on source selection**

While firm conclusions can not be drawn from this analysis of any relationships between age and information seeking, there are sufficient differences between the five age groups considered to here to justify the inclusion of age as a potential influence on source selection. The Under 25s and 71+ age groups used fewer sources, and while young people find these sources of somewhat or very important, the over 70s were more likely to find their important sources most important. Young people were the only age group to find the newspaper useful source at any stage, while other people directly were identified as in the top four important sources for just the 25-39 and 55-70 age group, even though they were important in both the alert and confirmation stages for most of the groups. Mainstream media appeared as consistent sources at all stages for the two older age groups, and as a most important source for the 25-39s and 40-55s and as an alert source for the 25-39s. In all, most important sources in all stages of the information seeking process across the age groups were news and weather websites, environmental cues, radio, television, and other people.

### 5.3.6.2. Gender

Gender has been described as an important variable in the information seeking process (Fothergill 1996). Women were found to be more likely to receive alerts from their social networks (Drabek 1969) and then use more information sources to confirm and find out more about the disaster. Men were more likely to require environmental cues before taking action (such as looking outside to see a tornado) (Donner, Rodriguez & Diaz 2007). This section will examine the data

collected on gender and look at potential relationships to the first alert, confirmation source and importance of sources. Disaster-experienced respondents including examined, with 133 female respondents and 66 male respondents.

**First alert:** The picture provided by the survey data on alert sources confirmed previous research that showed that social networks were an important source of information for women. Figure 5.23, below, shows that social networks played a very big part of how women found out about the disaster – 27.1% of the alert sources for women were other people directly and 8.3% were from other people indirectly, totalling 35.4% of all alert sources for females. Men, on the other hand, found out from other people in 19.6% of cases, and were more likely to find out via mainstream media (radio and television were each 21.2% of all alert sources). Mainstream media's role in alerting women was smaller, with 12.8% of alerts for women coming from radio and 16.5% coming from television.

There were similarities between the sexes in the alert source: environmental cues, agency text or phone messages, and news and weather websites were alert sources for similar numbers of men and women. Environmental cues alerted 16.5% of women and 18.2% of men; agency messages alerted 2.3% of women and 3% of men; and news and weather websites were an alert source for 9% of women and 10.6% of men.

In terms of the most prevalent alert sources for each sex, women were more likely to learn about a disaster from other people directly (27.1%), environmental cues (16.5), television (16.5%) and radio (12.8%). Men were more likely to receive their first alert from radio or television (21.2% each), environmental cues (18.2%) and other people directly (13.6%). This is illustrated in Figure 5.23, over the page.

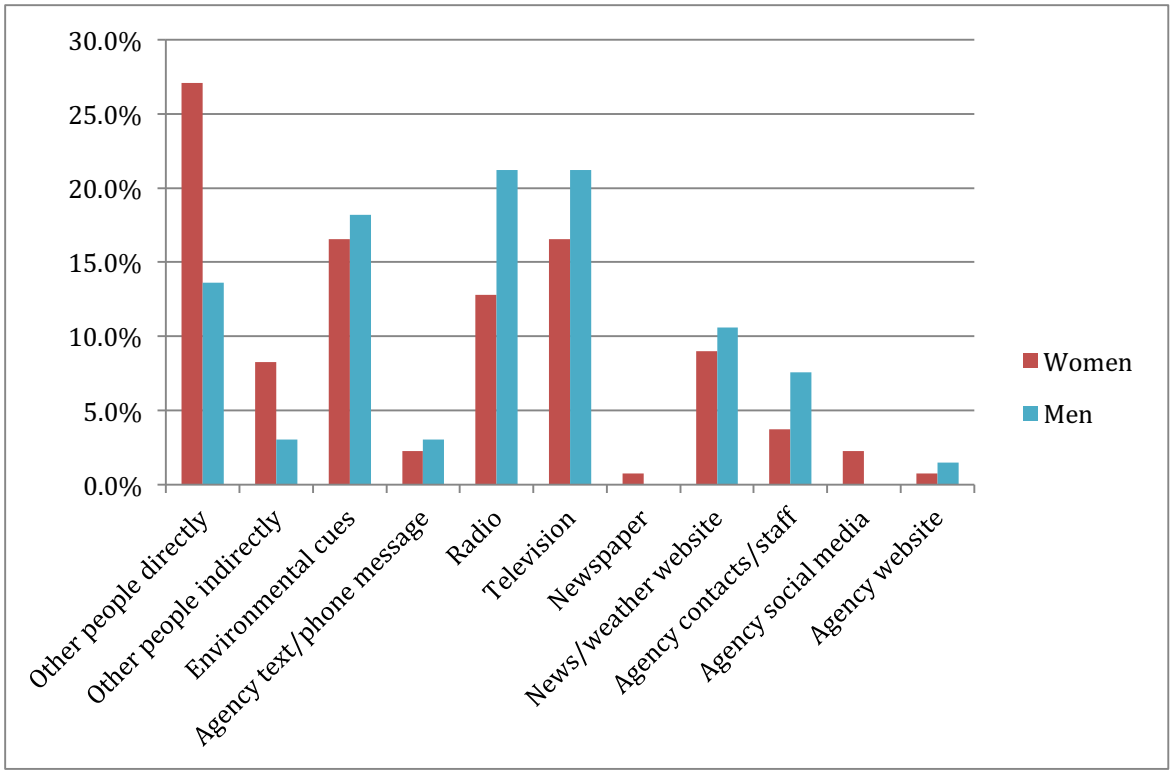



**Figure 5.23 Alert sources for women and men**

The data for gender alert sources is contained Table 5.27 below. The table and the graph presented in Figure 5.11 show that there are sufficient differences between men and women in disaster information seeking to justify inclusion of gender as a factor influencing source selection in the disaster information seeking model.

**Table 5.27 Alert sources for men and women**

| | Female | | | Male | | |
|---|---|---|---|---|---|---|
| | N | % of women | % of alert source | N | % of men | % of gender for that alert |
| **Other people directly** | 36 | 27.1 | 80.0 | 9 | 13.6 | 20.0 |
| **Other people indirectly** | 11 | 8.3 | 84.6 | 2 | 3.0 | 15.4 |
| **Environmental cues** | 22 | 16.5 | 64.7 | 12 | 18.2 | 35.3 |
| **Agency text/phone message** | 3 | 2.3 | 60.0 | 2 | 3.0 | 40.0 |
| **Radio** | 17 | 12.8 | 54.8 | 14 | 21.2 | 45.2 |
| **Television** | 22 | 16.5 | 61.1 | 14 | 21.2 | 38.9 |
| **Newspaper** | 1 | 0.8 | 100.0 | 0 | 0.0 | 0.0 |
| **News/weather website** | 12 | 9.0 | 63.2 | 7 | 10.6 | 36.8 |
| **Agency contacts/staff** | 5 | 3.8 | 50.0 | 5 | 7.6 | 50.0 |
| **Agency social media** | 3 | 2.3 | 100.0 | 0 | 0.0 | 0.0 |
| **Agency website** | 1 | 0.8 | 50.0 | 1 | 1.5 | 50.0 |
| **Total female/male** | **133** | **100** | **66.8** | **66** | **100.0** | **33.2** |

**Confirmation sources:** Confirmation sources after the initial disaster alert or warning was found to be different between sexes in some circumstances. For instance, in a storm, tornado or cyclone, men are more likely to confirm an alert by using visual cues than women, but overall, men and women use similar sources in the search for information following an alert. The graph in Figure 5.24 shows a small difference between men and women with the use of other people to confirm the disaster, but fairly even use of the other well-used sources for confirmation. For instance, radio and television recorded a difference of only 1.2% for radio and 1% for television. For news and weather websites, which was the most-often used confirmation source particularly by women, there was a difference of 4%. The most used confirmation sources were news and weather websites, radio and television for women, and news and weather websites, television, radio and other people directly for men.

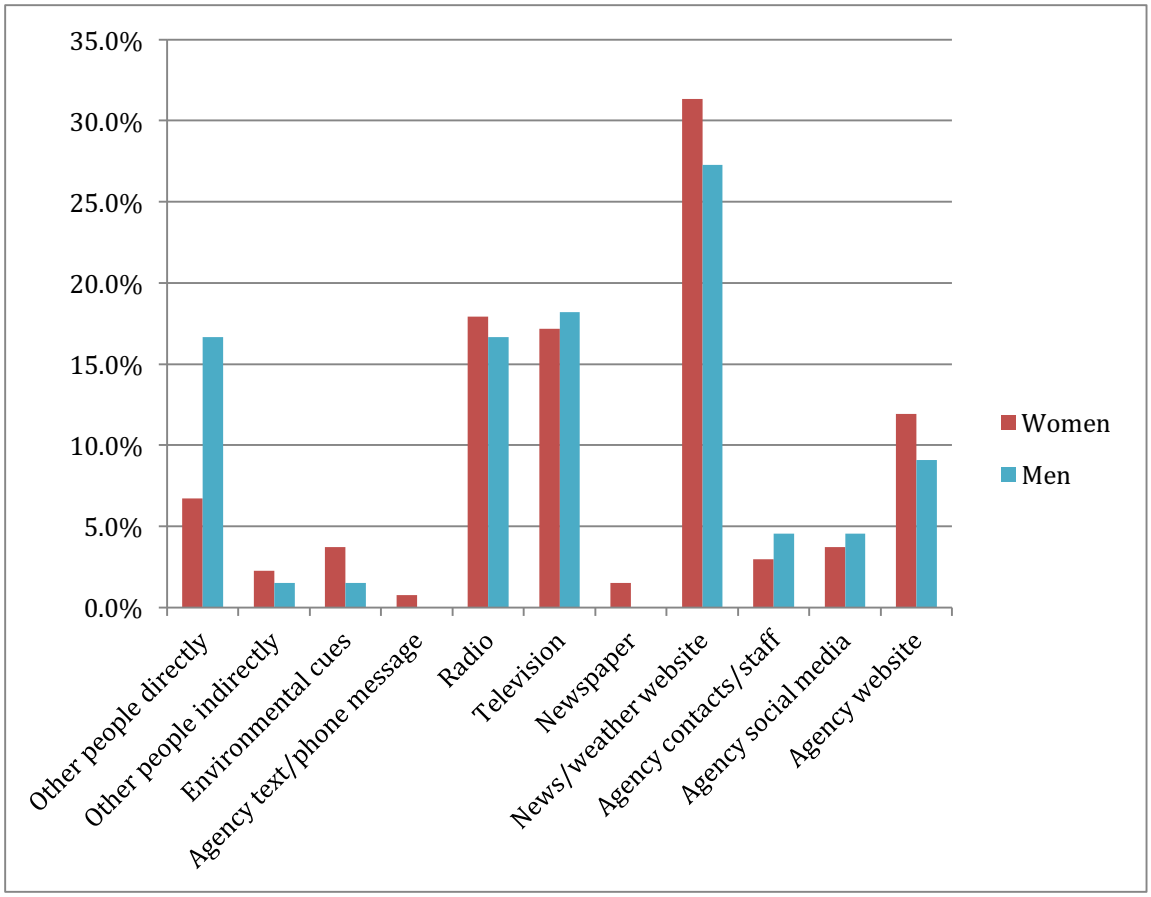



**Figure 5.24 Confirmation sources for men and women**

The data underlying this discussion is contained in Table 5.28.

**Table 5.28 Confirmation sources for men and women**

| | Female | | | Male | | |
|---|---|---|---|---|---|---|
| | N | % of women | % of confirm source | N | % of men | % of confirm source |
| **Other people directly** | 9 | 6.7 | 45.0 | 11 | 16.7 | 55.0 |
| **Other people indirectly** | 3 | 2.2 | 75.0 | 1 | 1.5 | 25.0 |
| **Environmental cues** | 5 | 3.7 | 83.3 | 1 | 1.5 | 16.7 |
| **Agency text/phone message** | 1 | 0.7 | 100.0 | 0 | 0.0 | 0.0 |
| **Radio** | 24 | 17.9 | 68.6 | 11 | 16.7 | 31.4 |
| **Television** | 23 | 17.2 | 65.7 | 12 | 18.2 | 34.3 |
| **Newspaper** | 2 | 1.5 | 100.0 | 0 | 0.0 | 0.0 |
| **News/weather website** | 42 | 31.3 | 70.0 | 18 | 27.3 | 30.0 |
| **Agency contacts/staff** | 4 | 3.0 | 57.1 | 3 | 4.5 | 42.9 |
| **Agency social media** | 5 | 3.7 | 62.5 | 3 | 4.5 | 37.5 |
| **Agency website** | 16 | 11.9 | 72.7 | 6 | 9.1 | 27.3 |
| **Total female/male** | **134** | **100.0** | **67.0** | **66** | **100.0** | **33.0** |

The data on confirmation sources for men and women does not point to a firm difference between the sexes, although the alert sources did show some differences. The next section will investigate importance of sources and possible links with gender.

**Importance of sources:** While there were small differences in the level of importance of sources between men and women, the order of importance was very similar. In the top five sources for each were radio, television, news and weather websites, other people directly and environmental cues, in that order for women. The order for men was radio, news and weather websites, other people directly, television and environmental cues for men. Otherwise, the rating of importance between men and women was similar in all sources. For instance, radio was the most important source for both men and women, with 90% of women identifying it as most important, very important, or of somewhat

importance and 88% of men rating it at some level of importance. On the micro level, some ratings diverged somewhat – 45.6% of men and 36.4% considered radio a most important source, and 44.1% of men and 38% of women classified news and weather websites as a most important source. However, most were similar – for instance, for 33.8% of men, television was a most important source and 30.2% of women regarded television as a most important source. Men tended to regard more sources as of little or no importance than women. The graphs below in Figure 5.25 and Figure 5.26 show the source importance ratings of men and women with disaster experience.

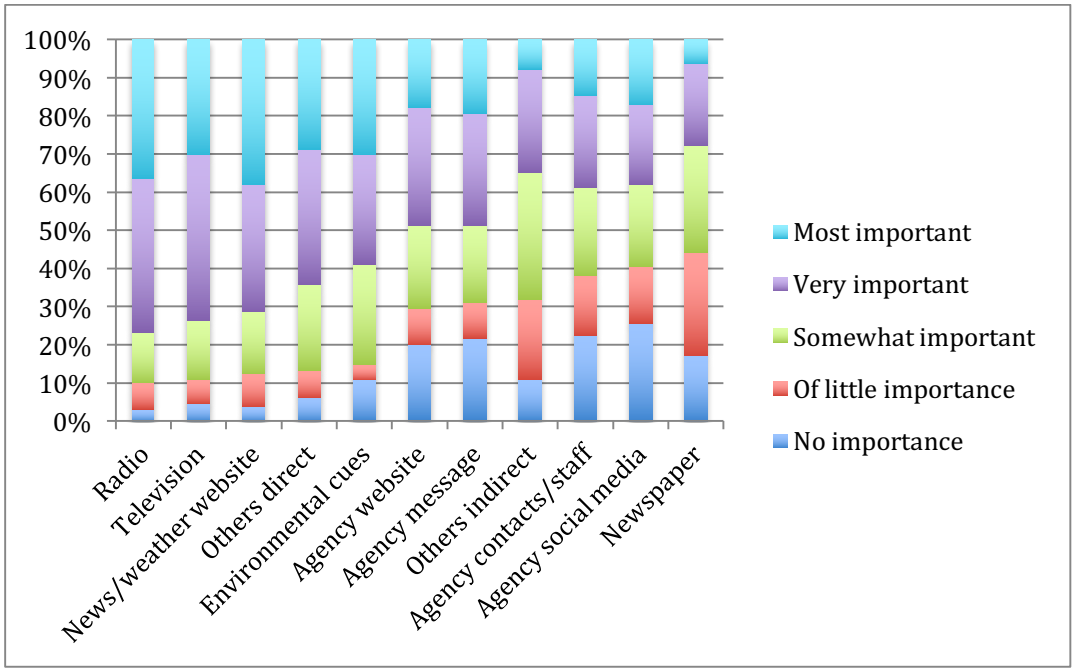



**Figure 5.25 Importance of information sources for women**

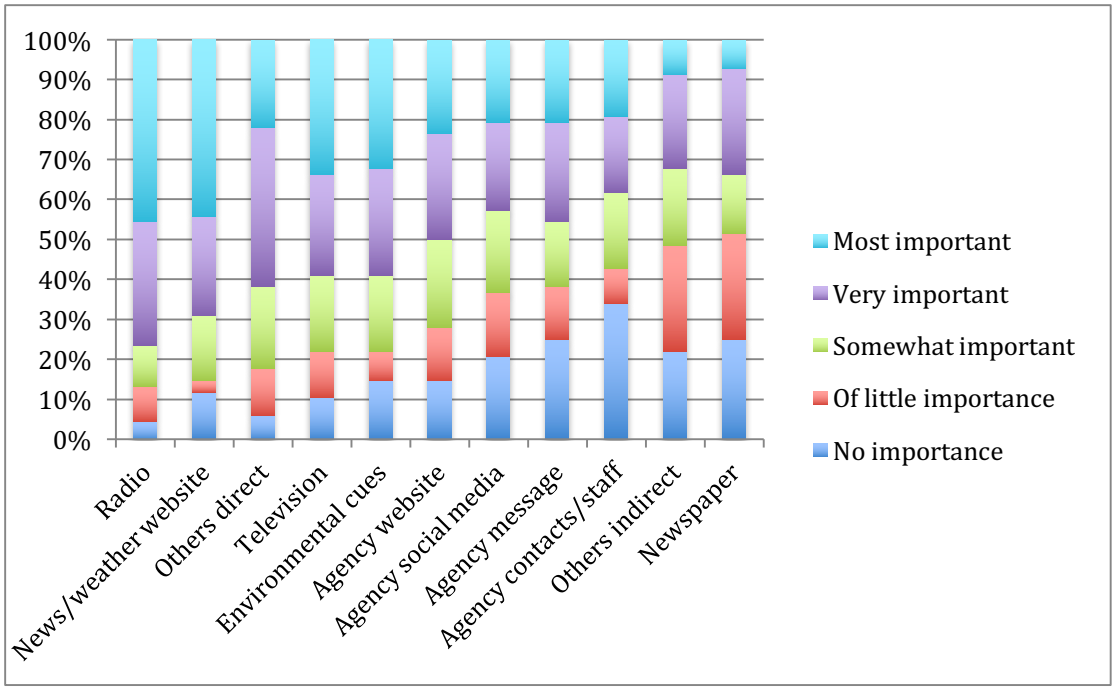



**Figure 5.26 Importance of information sources for men**

**Gender as an influence on source selection**

While there are differences between men and women in how they first hear of a disaster, there are many similarities in their subsequent disaster information seeking. The confirmation sources and the importance of sources are similar between sexes. However, the differences in alert source are sufficient to ensure gender is included in the model as one of the source selection influencing factors.

### 5.3.6.3. Proximity and location

The proximity to the disaster will be examined using the responses of people who indicated that their home or workplace had been evacuated during the disaster. Other questions could have been asked to establish proximity to the disaster, but such questions threatened to add further complexity to the survey, which would reduce responses. There were 26 responses to this question, which is not enough to make a definitive conclusion about the importance of proximity, but can be used as a guide in a similar way to age and gender sections.

**The first alert:** Alert sources were quite evenly spread for the respondents who were asked to evacuate compared with the general population. Key alert sources were other people directly, other people indirectly, environmental cues, radio and television, each on 15.4% of the subsample. In many cases, the evacuees' alert

experience reflected the rest of the disaster experienced sample, but there were differences in the role of other people indirectly, agency messages, news and weather websites and newspaper in alerts. Other people indirectly were an alert source for 15.4% of the evacuees and 5.2% of the main group, and agency messages were an alert source for 11.5% of the evacuees and 1.2% of the main group. News and weather websites played a smaller role in alerting evacuees (3.8%) than the main population (11%), and newspapers were an alertor more often for evacuees (3.8%) than the main population (0%). The similarities and differences are illustrated in Figure 5.27, below.

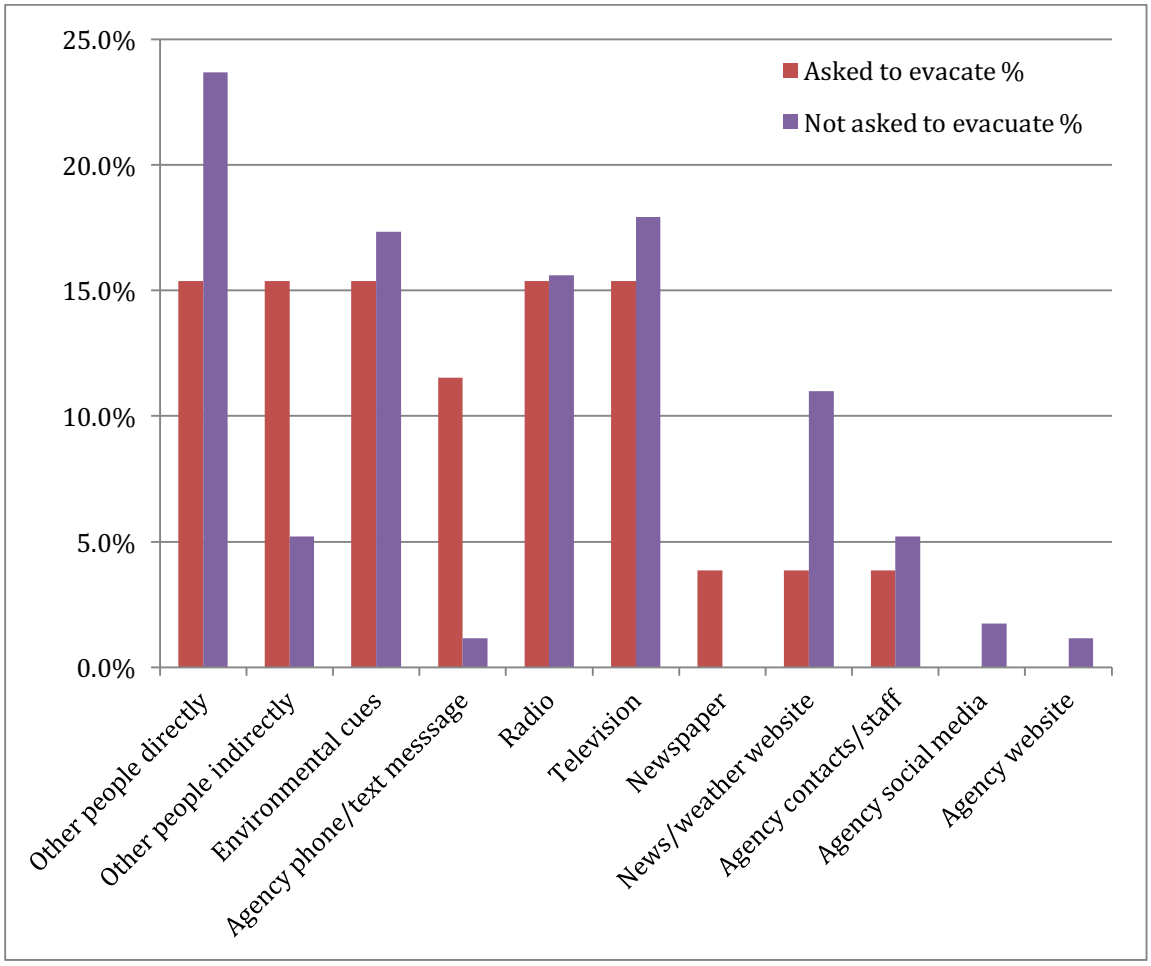



**Figure 5.27 Alert sources for those whose home or workplace were evacuated**

**Confirmation sources:** There seemed to be very small differences between the confirmation sources of the evacuation group and the main group. One difference of interest was the tendency for the evacuation group to use online resources more than the main group, with emphasis on official online sources.

For instance, the main confirmation source for the evacuation group was news and weather websites at 24% of the evacuees, which was also true for the main group, of which 30.9% used this source to confirm the disaster. However, the evacuees were more likely than the main group to use agency contacts or direct approaches to agency staff (8% compared with 2.9%), agency social media (12% compared with 2.9%) and agency websites (16% compared with 9.7%). In total, the evacuation group used online resources to confirm the disaster in 52% of cases, while the main group used online resources in 43.5% of cases. This is shown in the chart in Figure 5.28, below.

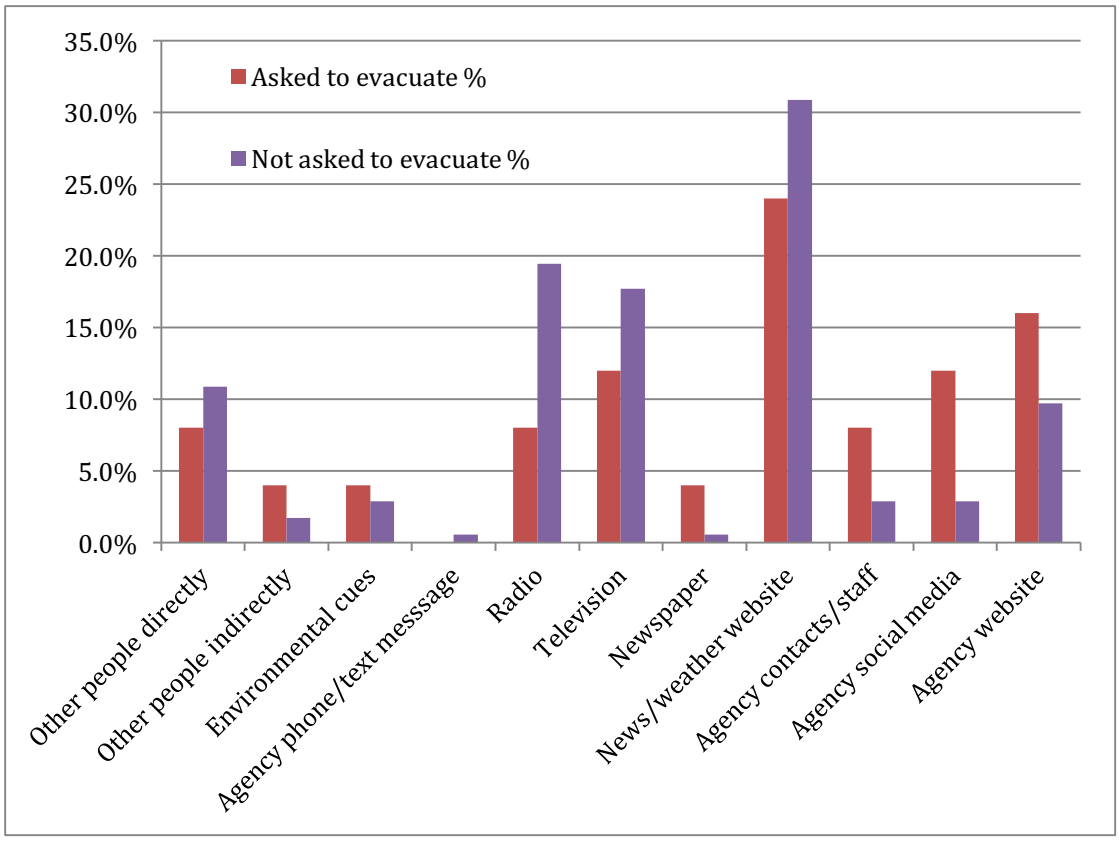



**Figure 5.28 Confirmation sources for those whose home or workplace were evacuated**

**Importance of sources:** Examination of the data on importance of sources for those in close proximity to a disaster showed that the people who had been asked to evacuate were more likely to identify information sources as of little or no importance than the main group of disaster-experienced respondents. Important sources were similar between the group: radio, then television, environmental cues, news and weather websites and others directly were most important, very

important or somewhat important for the evacuees, while radio, news and weather websites, television, other people directly and environmental cues were of importance to the main group. At the least important end of the scale, however, evacuees identified more sources as of little or no importance to them. For example, newspapers were of little or no importance to 69.3% of this group, while 42.7% of the main group reported newspapers to be of little or no importance. Agency contacts were also of little or no importance to 53.9% of the evacuation group compared with 35.7% of the main group. Similarly with agency social media (50% for the evacuees, 39.2% for the main group) and agency websites (46.1% for the evacuees, 26.9% for the main group). The importance charts for evacuees (Figure 5.29) and the non-evacuees (Figure 5.30) are below and illustrate the differences.

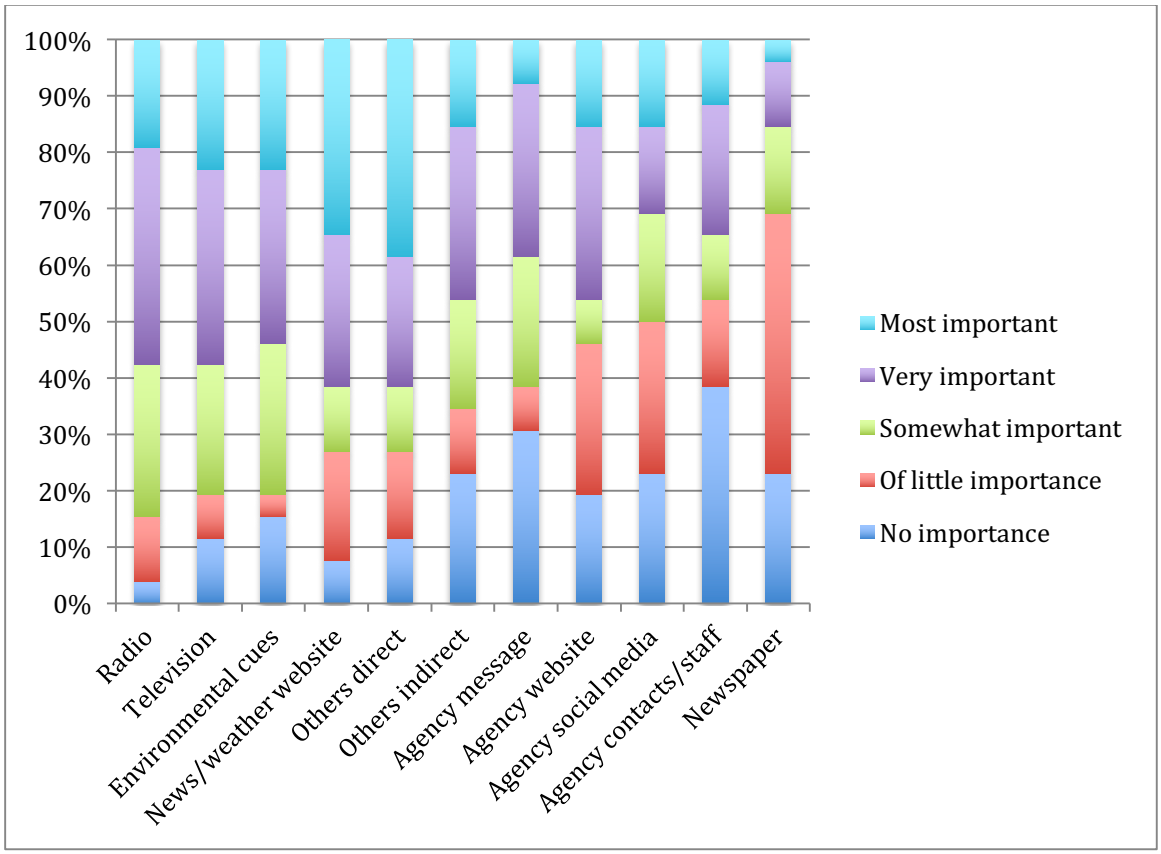



**Figure 5.29 Importance of sources for people who were asked to evacuate**

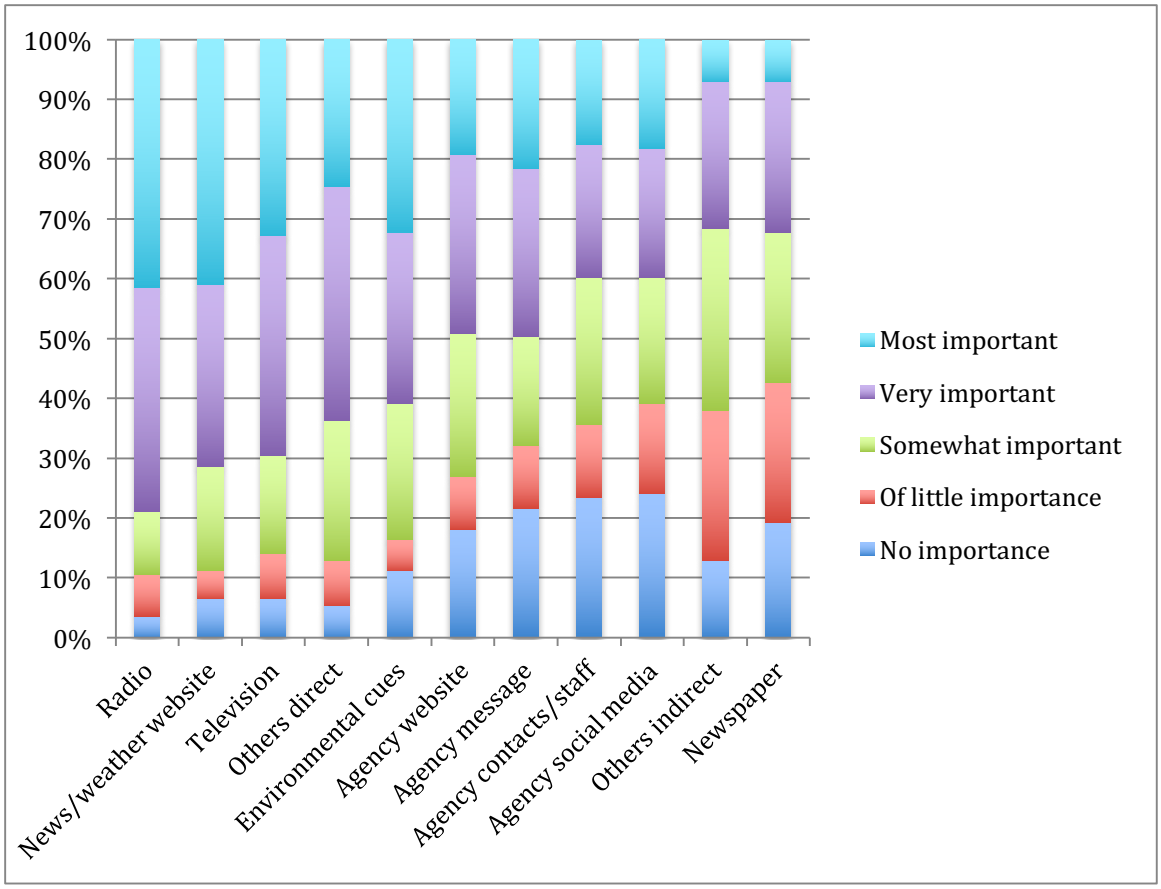



**Figure 5.30 Importance of sources for people who were not asked to evacuate**

### Proximity as an influence on source selection

The sample for this section was extremely small, which prevented any degree of confidence in this examination of proximity as an influence on source selection from being achieved. However, the presence of some differences between the evacuees and those not asked to evacuate on all three aspects of disaster information behaviour supports inclusion of proximity for testing once the model is complete. The key differences – the reduced role of other people directly as an alert and the identification of more sources as being of little or no importance – supports its inclusion, even if later testing discovers that the differences were caused by factors such as disaster type or source availability. In addition, the single question using evacuation as an identifier or proximity was not sufficient to determine whether proximity should be included as a factor that influences source selection. For this survey, it was necessary to keep the questions simple, and the matter of proximity can be complex depending on the scope of the disaster, the type of disaster, perceptions of distance and many other factors.

Proximity will be retained at this stage as a factor that influences source selection and can be tested in more depth in other research.

#### 5.3.6.4. Social ties

The literature review discussed the involvement of social ties in disaster behaviour and disaster information seeking, with social ties being a complex concept related to family and household structure, position within the community and membership of social networks. It also referred to how existing social networks could be used and new ones forged in disaster (Mileti 1995). While the influence of social ties, especially household composition and the effect of dependents, on evacuation and other disaster behaviour has been confirmed, in information seeking in a disaster only the influence of family and neighbours as information sources has been seen (Aguirre & Tierney 2001; Donner, Rodriguez & Diaz 2007; Eisenman et al. 2007; Greenberg, Hofschire & Lachlan 2002). This chapter has so far showed the considerable role of other people in alerts and their appearance in the confirmation stage and as important sources, and will do so in further depth in other sections. This section will consider the role of the number of people in a household and the number of dependents of the respondent in the alert, confirmation and importance of sources. The people in the household question provided four options: 1 (n=31), 2 (n=81), 3-4 (n=67) and 5 or more (n=20). Reasonable numbers were achieved in each group from which guidance on whether household numbers might be a factor in source selection was used. However, in the dependents question, numbers were problematic as households got bigger. The possible responses and the number of responses they received were: none (n=119), 1-2 (n=60), 3-4 (n=16) and 5 or more (n=1).

**The first alert:** The influence of the number of people in a household seems to have influence in the first alert, particularly in the smallest and largest households. For instance, households with five or more people were more likely to learn about the disaster from television and environmental cues (25% each). Households of one person were more likely to learn about the disaster from radio (29%) and television (22.6%). The third most prevalent alert for both groups came from other people directly (one person 16.1% and 5 or more 15%). However, for households of 2 people or 3-4 people, other people directly was the predominant alert source (25.9% and 23.9% respectively). Fewer information sources played a role as an alert source for households of five or more people – agency websites, agency contacts/staff, newspapers and agency messages were not identified as

alert sources by respondents from this size household. Figure 5.31 illustrates these points, plus the divergence of households on most alert sources except for news and weather websites, agency messages, newspaper and agency websites.

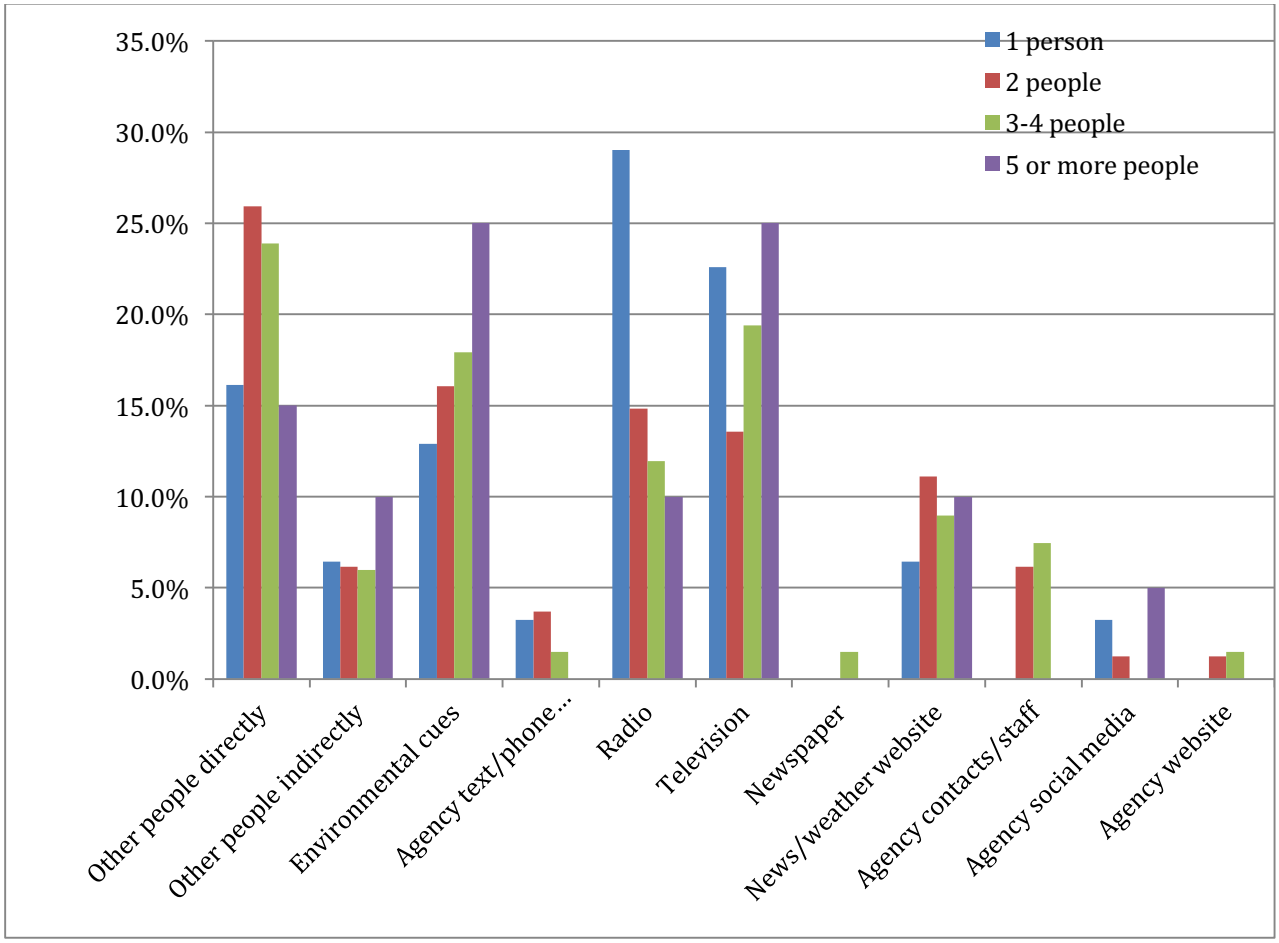



**Figure 5.31 The role of alert sources in different household sizes**

The relationship between the number of dependents and alert source types was not evident, with respondents with no dependents identifying similar alert sources to those with 2 or 3-4 dependents. Just one respondent had five or more dependents and the alert source here was other people directly. The other groups however, were clustered around radio, television and environmental cues, with a small difference between people with 3-4 dependents and those with fewer dependents in receiving an alert from other people: 12.5% of respondents with 3-4 dependents received an alert about the disaster from other people directly, while 22.7% of people with no dependents and 23.3% of people with 2 dependents received the alert this way. This is shown in Figure 5.32. An outlier, the single respondent in the '5 or more dependents' group (100% other people

directly), was left off the graph below to allow a clearer picture of the sources for the other groups.

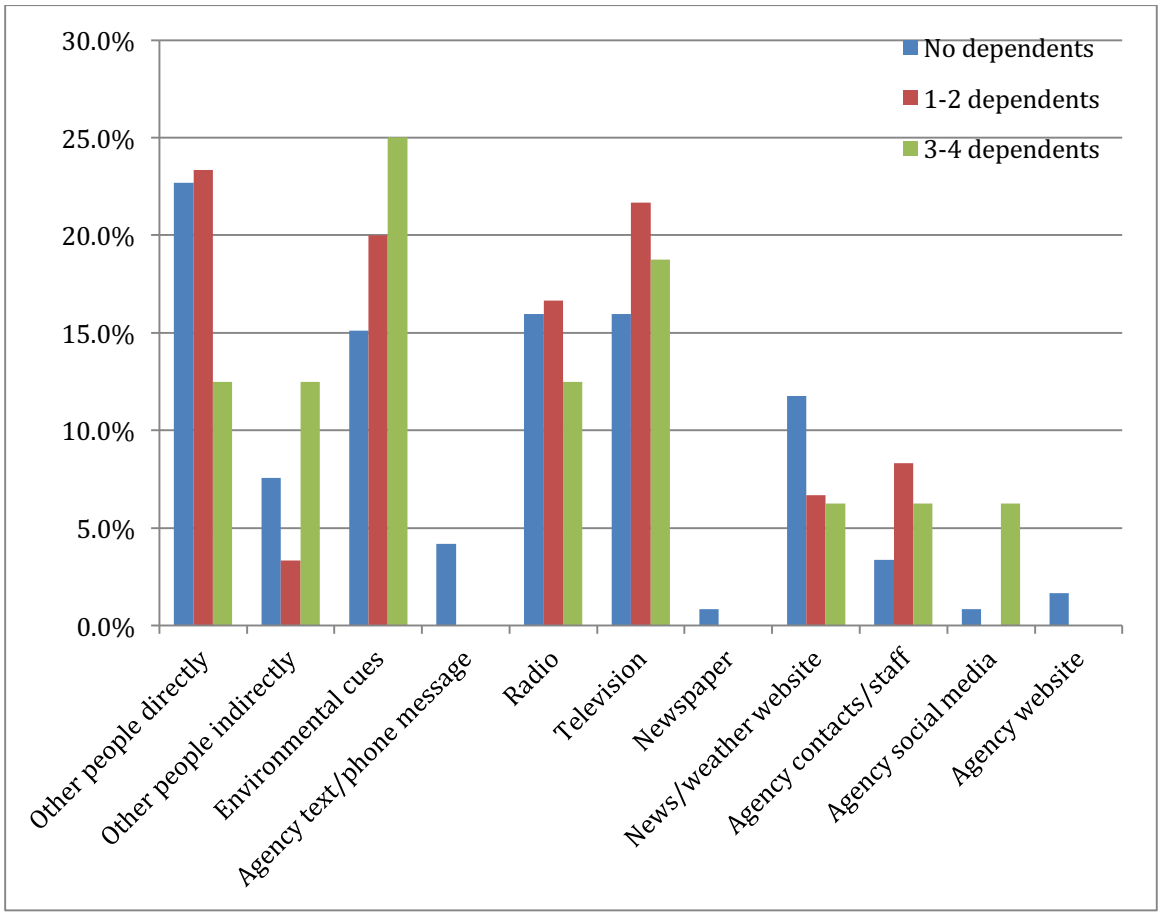



**Figure 5.32 The role of alert sources for people with dependents**

**Confirmation sources:** Similarities appeared between household sizes in where they turned to for more information for a number of sources. Households of two, three to four and more than five people were more likely to turn to news and weather websites (33.7%, 31.8% and 35% respectively), while people living by themselves were less likely than the other household sizes to use this source (12.9%) and more likely to first turn to television (29%). For people living in the largest households, television was a source used to confirm the disaster by 10% of the group. People in two person households made good use of radio as a confirmation source, with 22.9% of this group turning to radio. The distribution of confirmation sources by household size is shown in Figure 5.33.

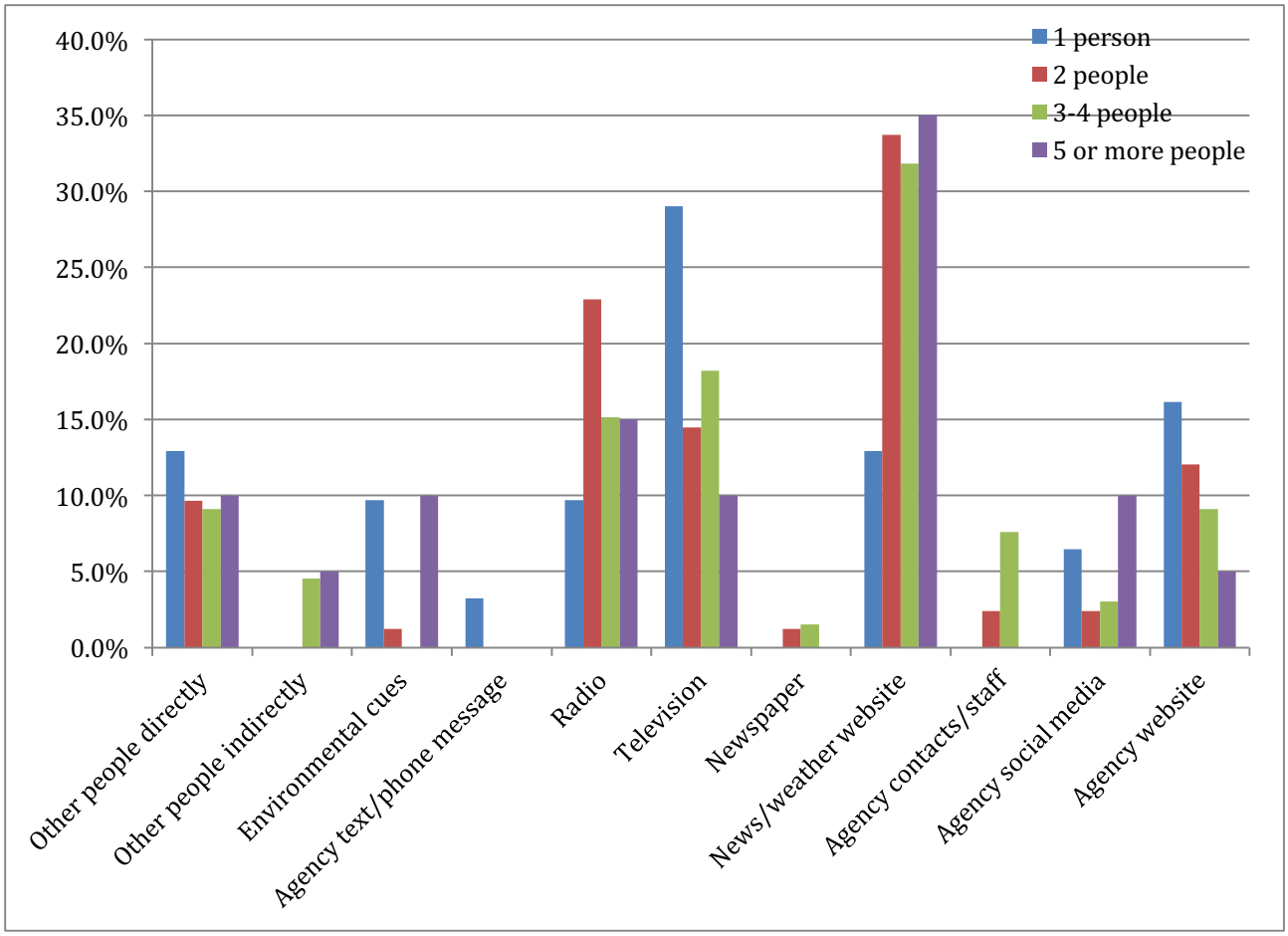



**Figure 5.33 Confirmation sources of information by size of household**

The number of dependents and the confirmation sources used were similar except in two cases. The one respondent with five or more dependents used television to confirm the disaster, while people with three to four dependents were more likely to use a news or weather website to confirm the disaster (50%) then other people directly (18.8%). The no dependent and one or two dependent households were spread fairly evenly across radio (18.3% and 20%), television (15.8% and 23.3%) and news and weather websites (30.8% and 25%) as their confirmation sources. Figure 5.34 below, illustrates the differences and similarities. An outlier, the single respondent in the '5 or more dependents' group (100% television), was left off the graph below to allow a clearer picture of the sources for the other groups.

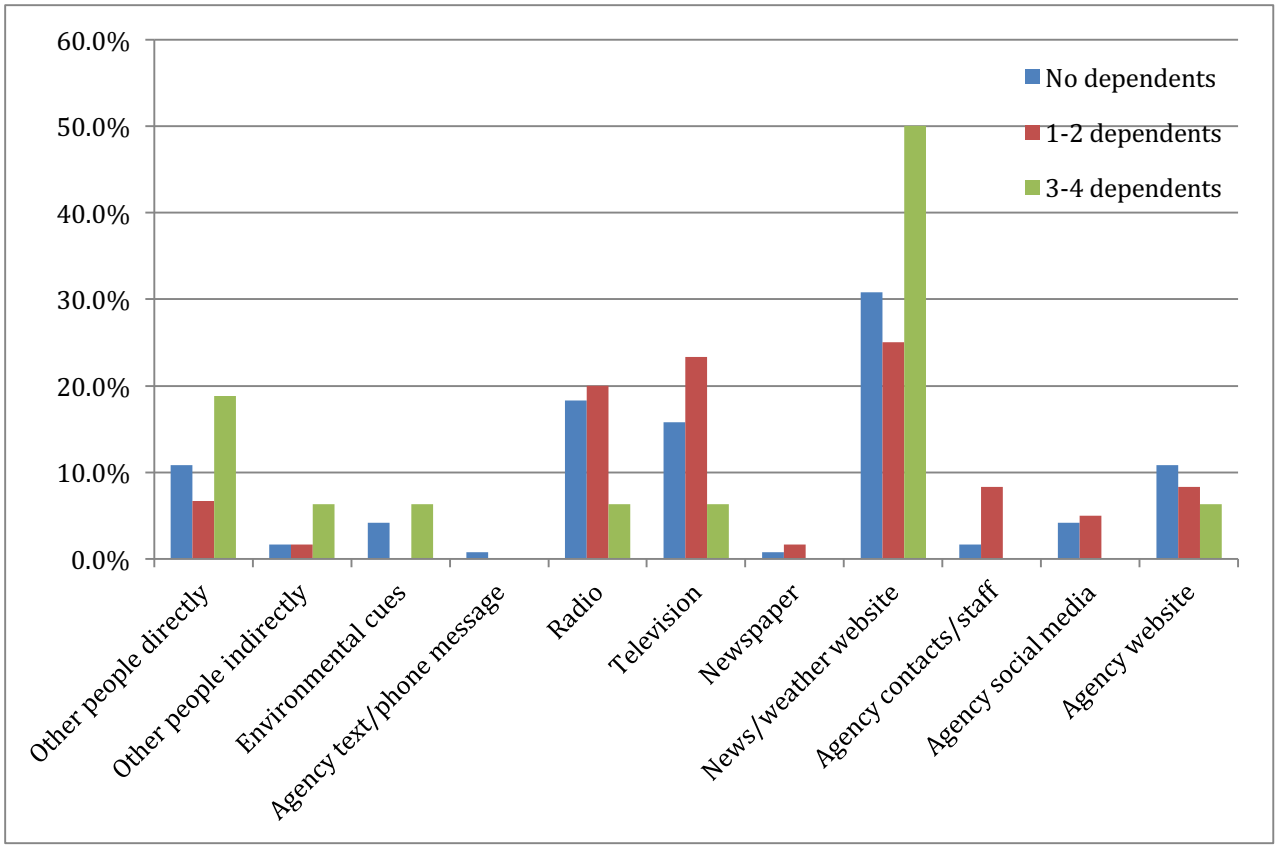



**Figure 5.34 Confirmation sources of information by number of dependents**

**Importance of sources – household size:** The larger the household, the more respondents depended on mainstream media as their most important sources. The smaller to medium households had similar profiles of most important, very important and somewhat important, using a mix of television, news and weather websites, radio, environmental cues and other people directly as their important sources. In each group, up to about 20% of respondents identified at least one of these as of little or no importance to their information seeking process. People in households of five or more, however, seemed to put their trust completely in television, radio, news and weather websites and environmental cues, with very few of them identifying that these were not important sources. Radio attracted no negative responses (of little or no importance), television and news and weather websites only 5.3% and environmental cues only 10.5%. Figure 5.35, Figure 5.36, Figure 5.37 and Figure 5.38 show the importance ratings of the different sized households for each information source.

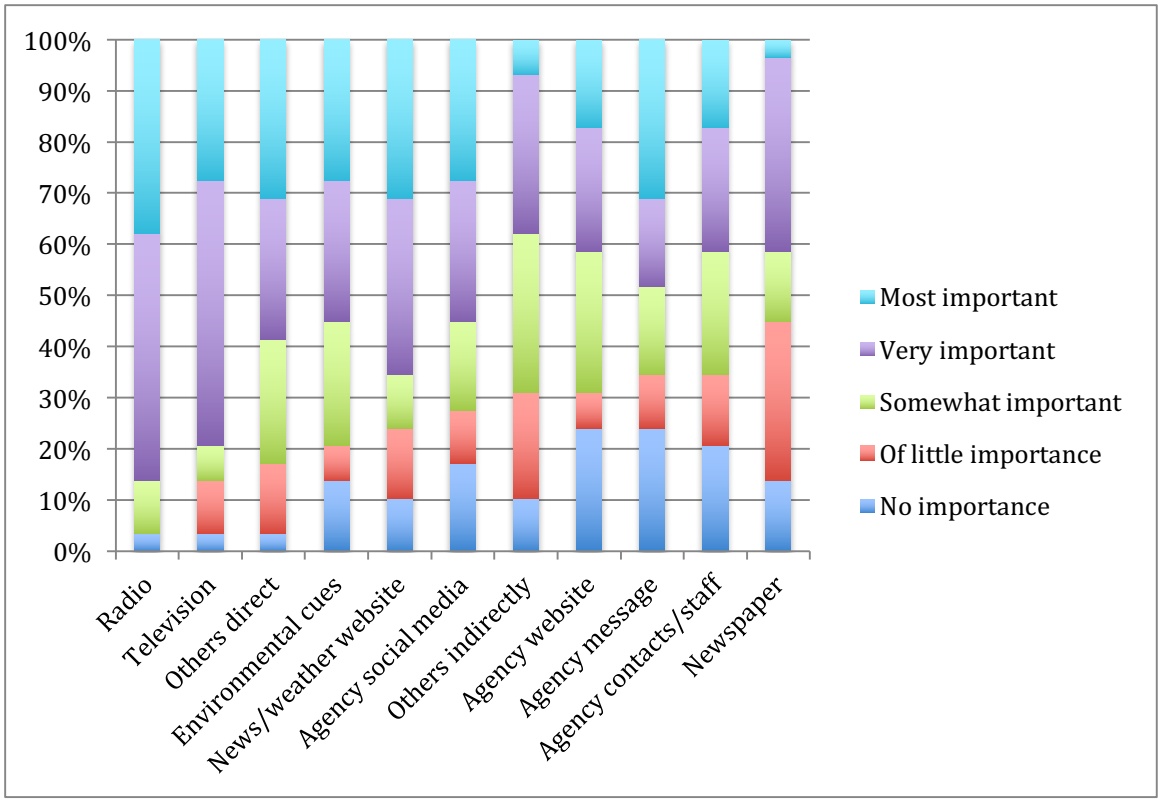



**Figure 5.35** **Importance of sources for respondents in single person households**

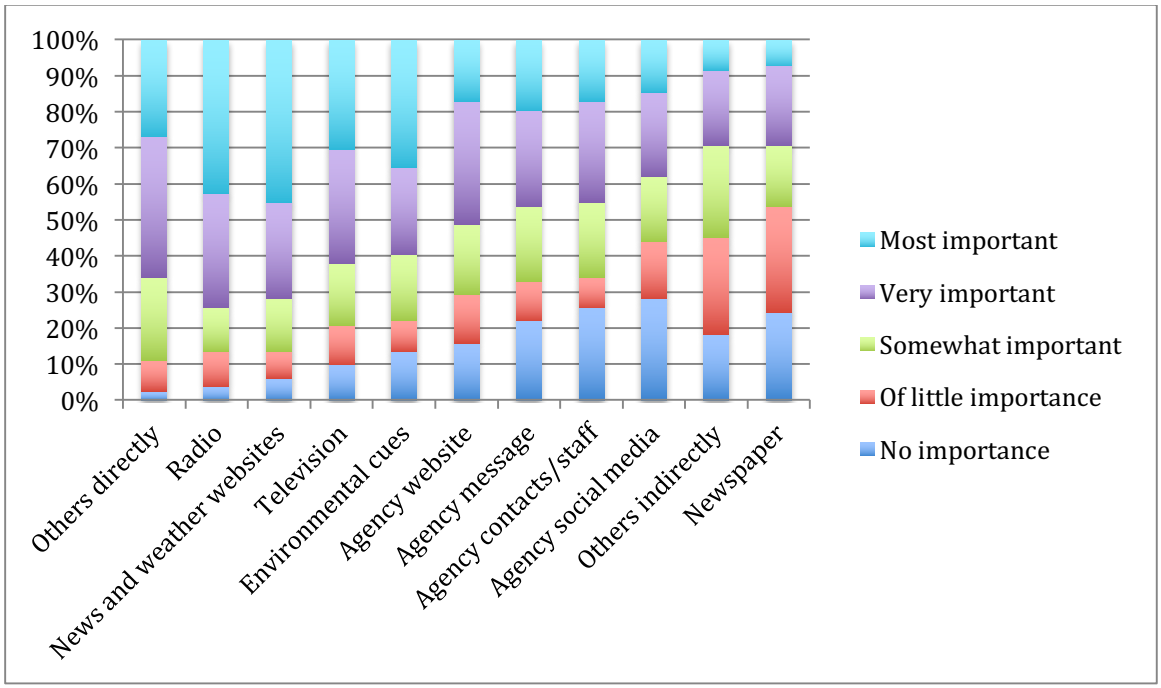



**Figure 5.36** **Importance of sources for respondents in two person households**

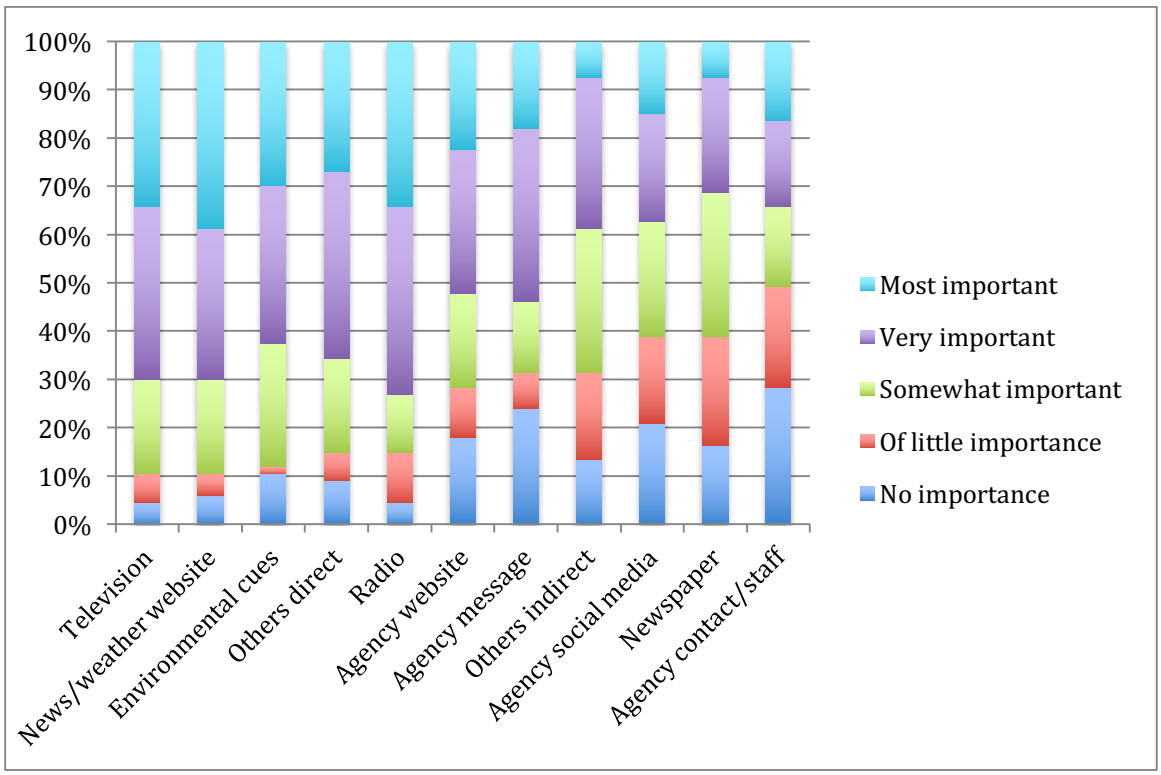



**Figure 5.37 Importance of sources for respondents in 3-4 person households**

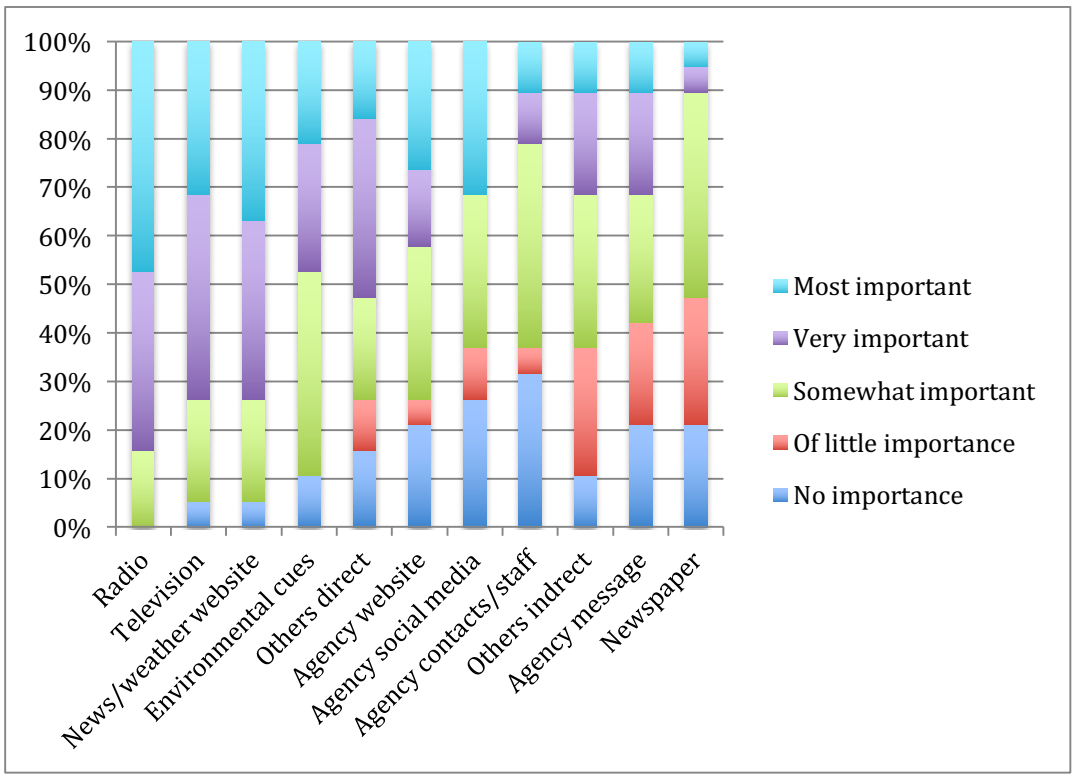



**Figure 5.38 Importance of sources for respondents in 5 or more person households**

**Importance of sources – dependents:** Four categories of dependents were examined during the survey, but only three will be considered here because the category, 5 or more dependents, received one response. The most obvious point to emerge from the rating of source importance was that people with more dependents rated more of the sources of little or no importance. However, the top five sources (those rated most, very or somewhat important) were similar across all of the groups, regardless of the number of dependents each respondent had. The sources were radio, other people directly, news/weather websites, television and environmental cues. The order of these five was different across the groups, but the level of importance to the respondents was quite similar, with all attracting some level of importance for at least 80% of each subsample. The figures below (Figure 5.39 to Figure 5.40) provide details for each group.

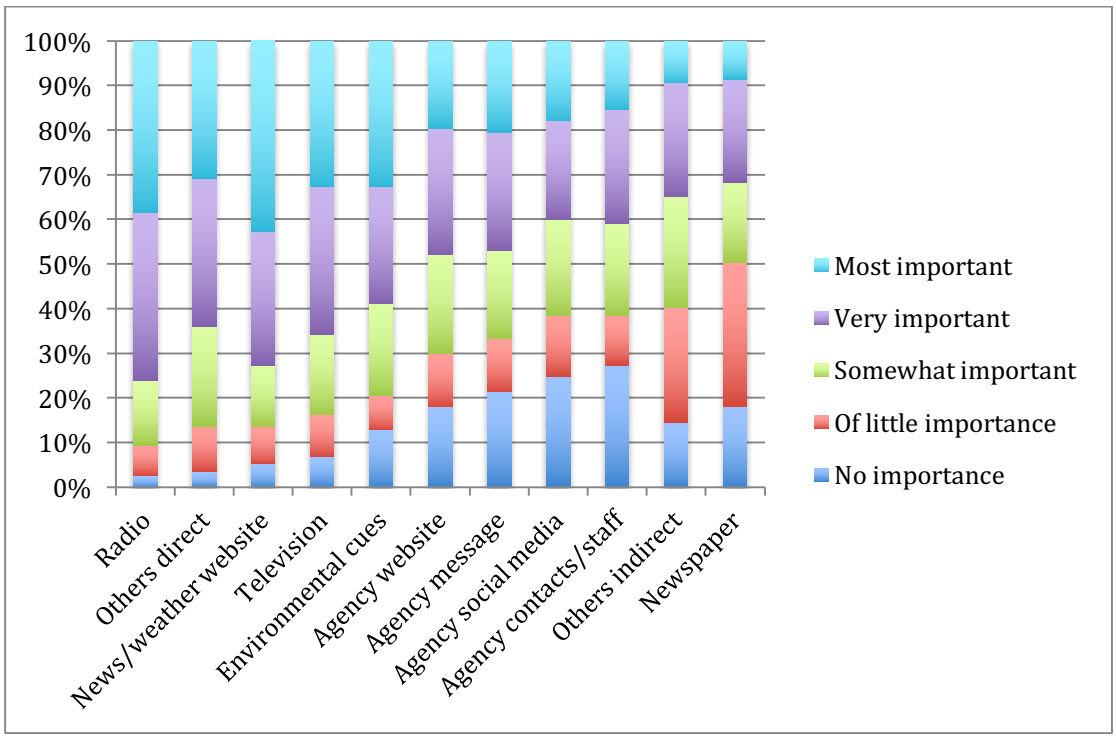



**Figure 5.39 Importance of sources for respondents with no dependents**

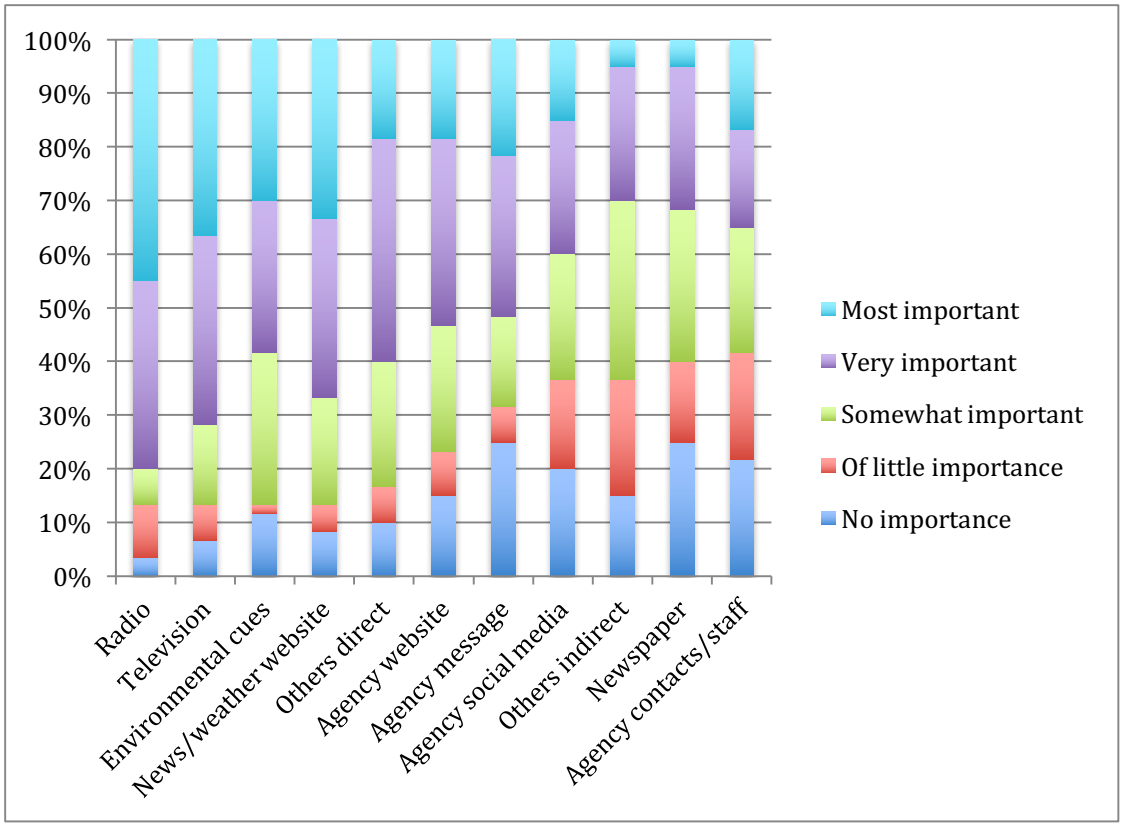



**Figure 5.40 Importance of sources for respondents with 1-2 dependents**

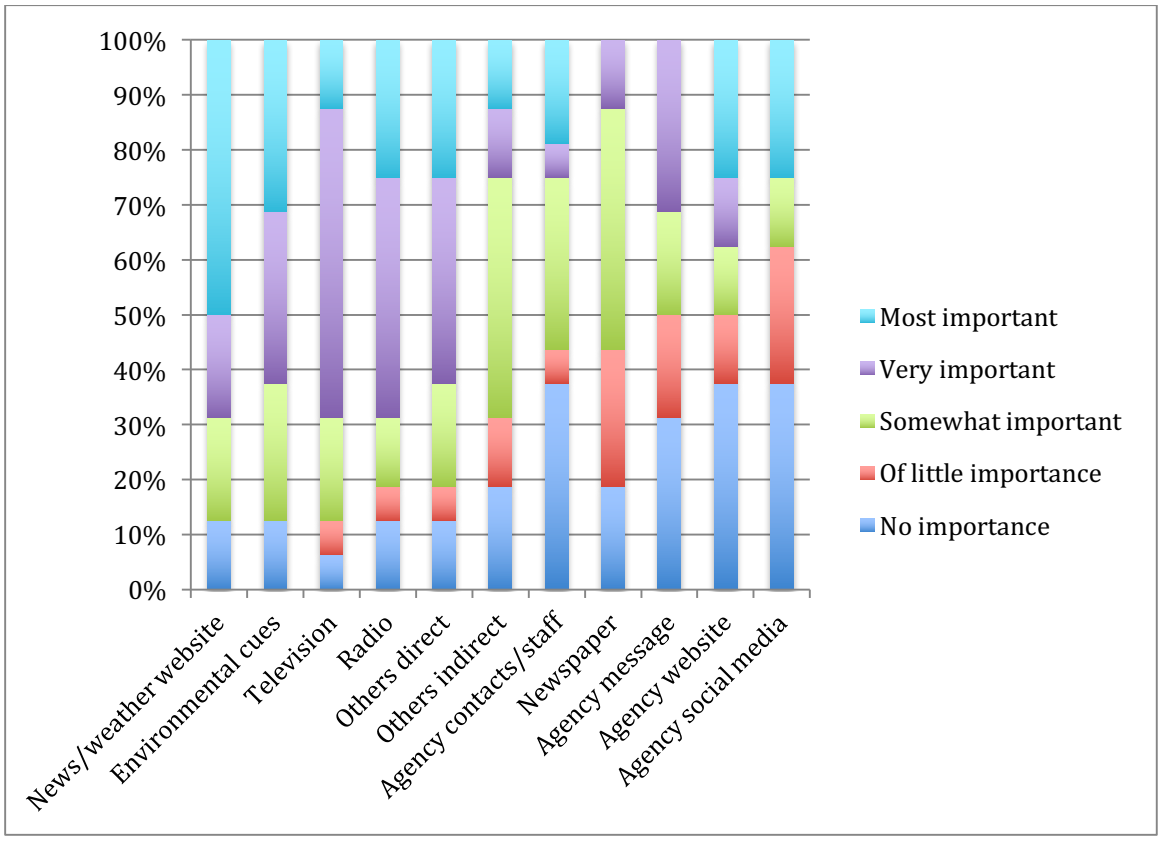



**Figure 5.41 Importance of sources for respondents with 3-4 dependents**

**Household size and number of dependents as influences on source selection**

The key points that emerged from this section were that larger households used fewer information sources, and television and environmental cues were predominant. This was not reflected in households where the respondents had more dependents – these households found news and weather websites and environmental cues were more important sources. In one-person households, radio and television were key sources, while in households where there were no dependents, radio, other people directly and environmental cues were predominant. The greater use of traditional media by the smaller households than the larger households might also be a factor of age, as many older people live by themselves or with their partner. The use of news and weather websites combined with use of a fewer number of sources by respondents with more than three dependents might indicate a lack of time and easily accessible information at a time that suits the respondent's schedule, but this needs to be researched further.

Regarding alert and confirmation sources, key points from the dependents data showed that alert sources were similar across the no dependents, 1-2 dependents and 3-4 dependents groups, and confirmation sources were spread fairly evenly with the exception of news and weather websites for respondents with 3-4 dependents. The 15% difference between single person households and other groups where radio played a role as an alert source, plus the five percent difference on environmental cues between 5+ households and the other groups as an alert show differences that should be tested in earnest in future. These differences support the inclusion of household size and number of dependents as filters that influence source selection in the disaster information seeking model.

### 5.3.6.5. Education

The effect of education on information seeking or even disaster behaviour generally was unclear from the literature review. Greenberg at al (2002) found that people with the lowest levels of education were more likely to use television during the reporting of the 9/11 attacks on the World Trade Center, but also found that the use of television could have been a function of where people were at the time – college educated people were more less likely to be at home and therefore had reduced access to television. People with higher education levels were less likely to use informal sources (Aguirre & Tierney 2001). Overall

though, researchers have been reluctant to draw conclusions about the relationship of education to disaster behaviour. This section will consider differences and similarities in information seeking behaviour between respondents of differing education levels for this study.

**The first alert:** While respondents did not actively select the source by which they first heard of the disaster, this source would be a source of information that they usually have access to in every day life information seeking. People with a primary school education (n=18) were spread across three main sources, and these sources played a greater role in the alert for this group than any other education level: other people directly (31.3%), then radio and television (25% each). The primary school-educated people were less likely to hear of the disaster from any of the other sources. In fact, only three other sources were identified by this group as alertors: environmental cues, agency phone or text messages, and news and weather websites. High school educated people (n=32) were quite evenly spread across a larger number of alert sources – environmental cues (22.6%), other people directly (19.4%), radio (19.4%) and television (16.1%) and then (in very low numbers) other people indirectly, news and weather websites, agency contacts or some other contact with agency staff, and agency websites. People with vocational education (n=46) or university education (n=104) tended to use more sources, with 10 out of 11 sources selected by at least some of each group. The interesting alert source for the vocationally educated group was the news/weather website. This group was the most likely of all four groups to have been alerted by a news or weather website to the disaster (18.8%) compared with the other groups (6.3 to 6.7%). Figure 5.42 over the page shows these patterns.

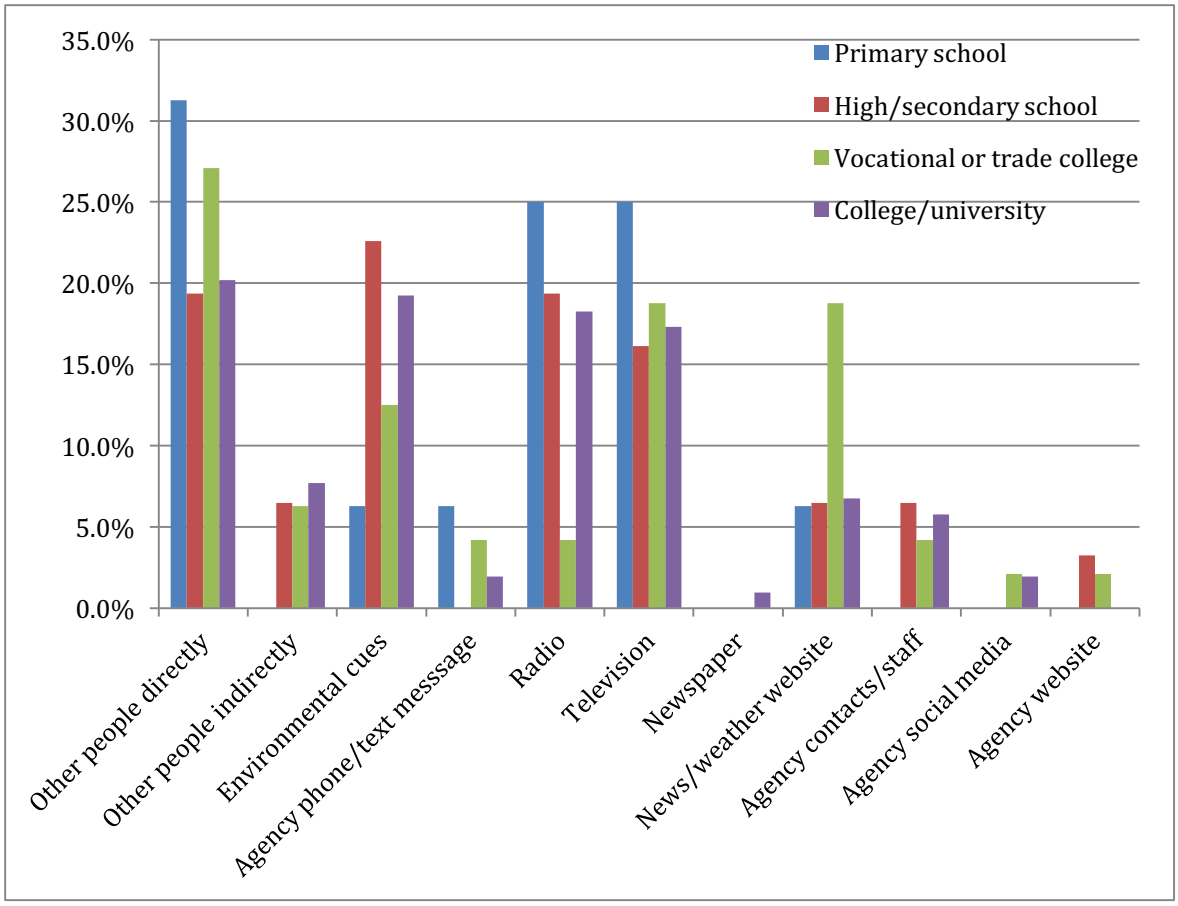



**Figure 5.42 Alert sources and level of education**

**Confirmation sources:** The preferences for people of lower levels of education that were discovered in the literature review were confirmed in this survey, with television the most preferred confirmation source for people with a primary school education. Of this group, 38.9% identified television as the source they turned to for more information, while of the all three other groups, only around 15% of respondents in each group used television as a confirmation source. These groups were more likely to use news and weather websites as their main confirmation source: 31.3% of high school-educated people identified websites as their confirmation source, 34.8% of those with vocational or trade education and 28.8% of those with university education. However, the primary school educated group identified news and weather websites as their second confirmation source (22.2%). The only group to have identified every source as a confirmation source was the university-educated subsample, but this group was clustered around news and weather websites, radio (19.2%) and television (15.4%), shown in Figure 5.43.

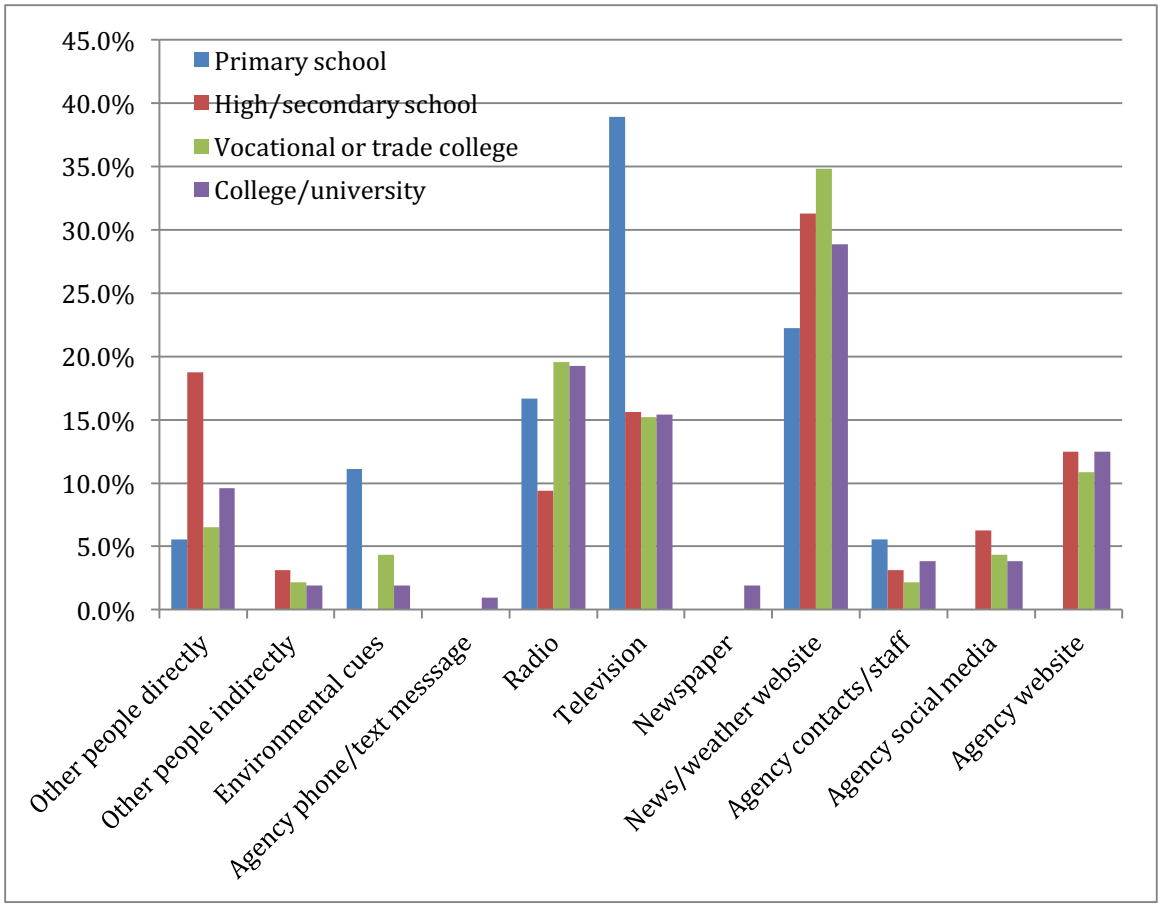



**Figure 5.43 Confirmation sources and level of education**

**Importance of sources:** Like some of the previous factors considered as influences on source selection, the education level groups shared the top five sources in terms of importance, but in different order. These were radio, other people directly, news and weather website, television and environmental cues. A few small differences between the groups could be identified. The primary school-aged respondents were more likely to find the widest spread of sources of little or no importance – around 30% of this group found every source except radio unhelpful. The vocational/trade educated group registered the biggest cluster of dissatisfaction with five sources, marking agency messages, agency social media, newspaper, agency contacts/staff and other people indirectly as of little or no importance for about 50% of this group. The other groups tended to average about 20-30% in their ratings at this end of the importance scale. The charts below in Figure 5.44, Figure 5.45, Figure 5.46 and Figure 5.47 help to illustrate these points.

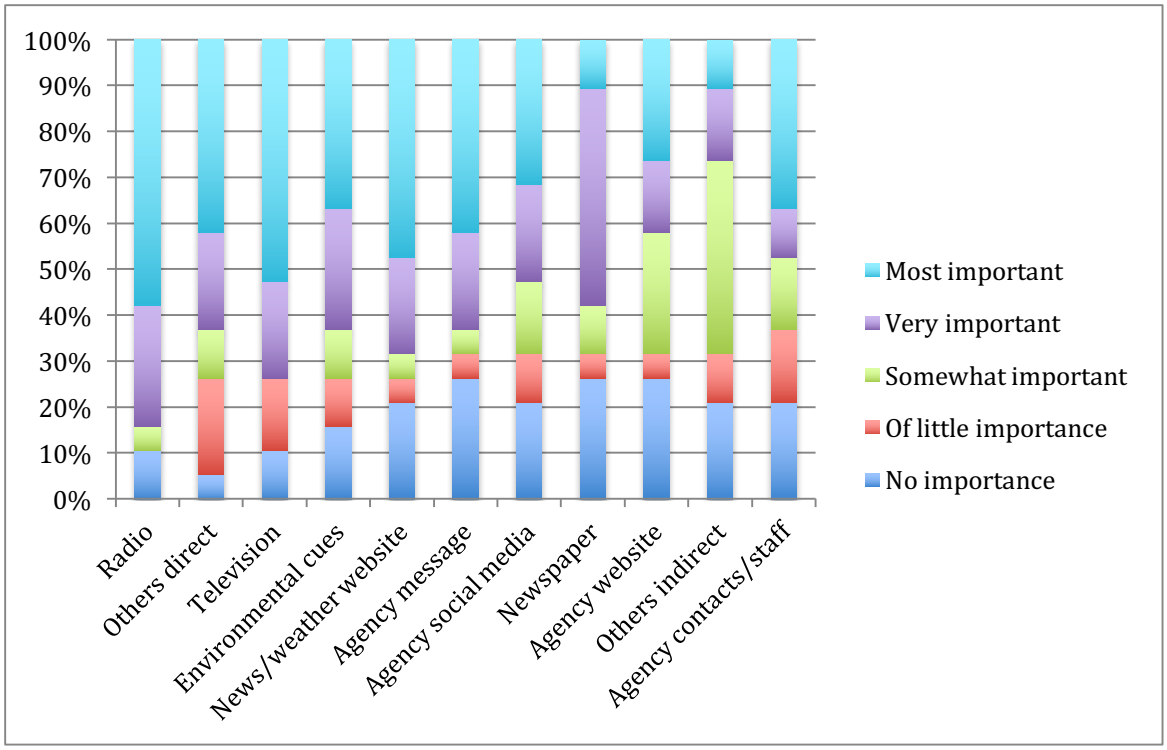



**Figure 5.44 Importance of sources for primary school educated respondents**

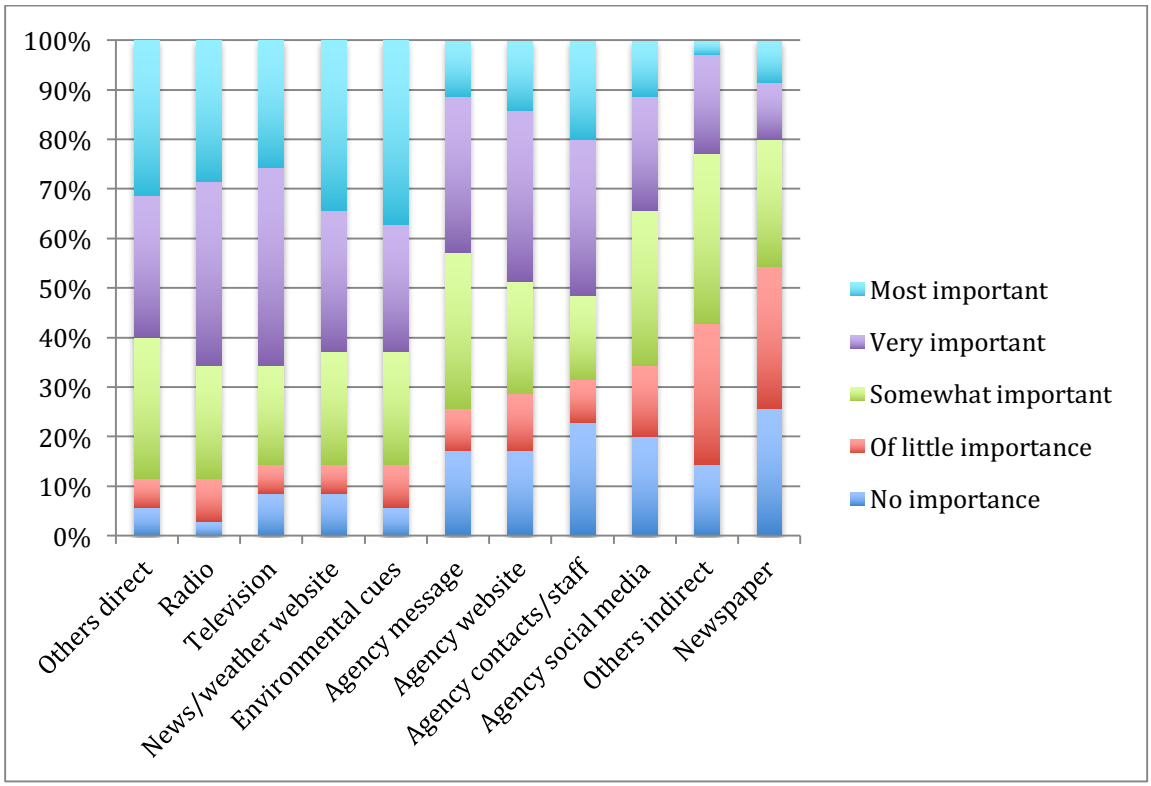



**Figure 5.45 Importance of sources for high school educated respondents**

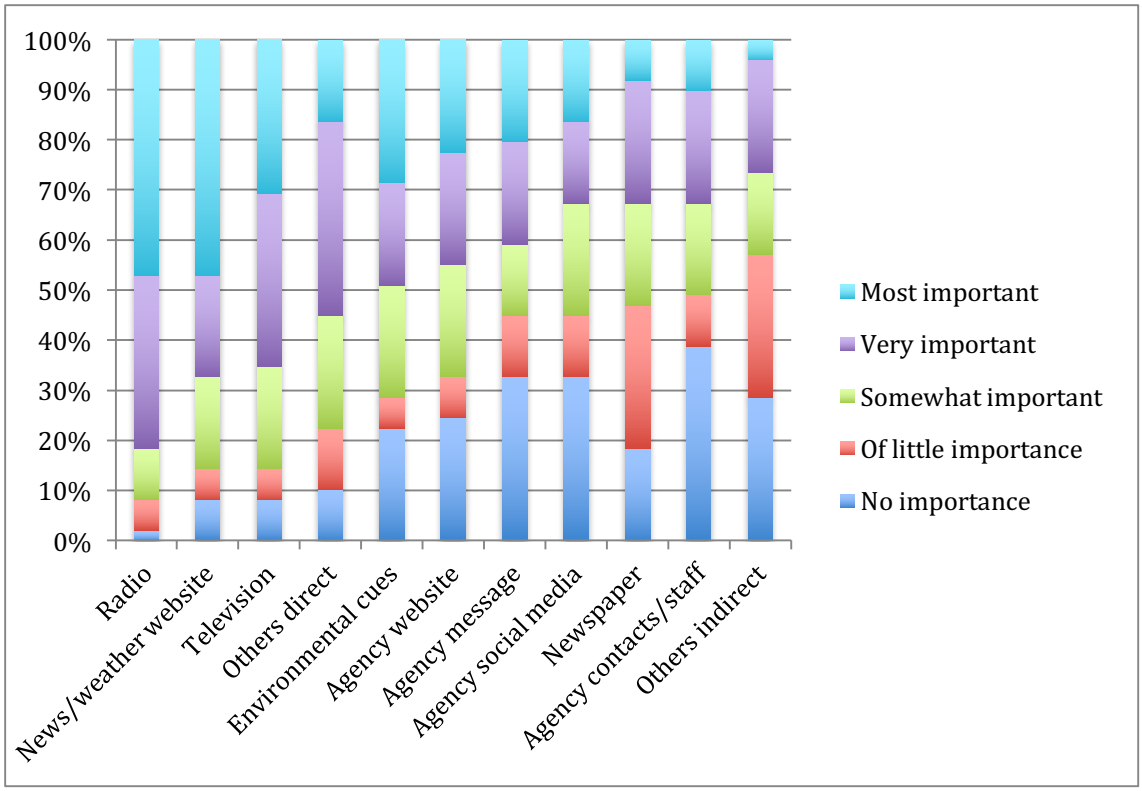



**Figure 5.46** **Importance of sources for vocational or trade college educated respondents**

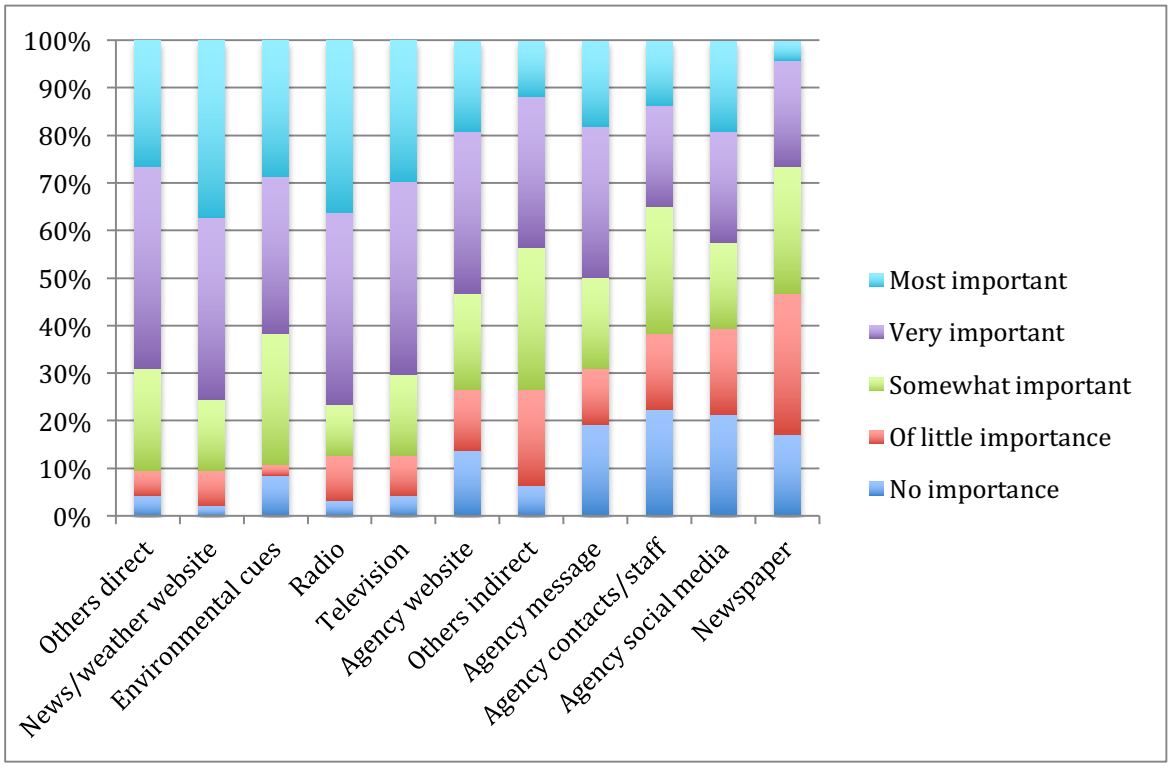



**Figure 5.47** **Importance of sources for college or university educated respondents**

**Education as an influence on source selection**

This potential filter for information sources showed some firm differences in the confirmation stage between sources used by people of different education levels. The role of television as an alert and confirmation source for those with a primary school education is marked, and the differences between groups on the number of sources used – those with the lowest level of education used the least number and those with the highest level using the highest number of sources – was also a key difference. For these reasons, education should be retained in the influences on source selection in the disaster information seeking model.

### 5.3.6.6. Income (resources)

**The first alert:** The first alert showed some obvious differences between the groups based on income. For instance, the most prevalent first alert for people on the two lowest household income bands was other people directly, with 31.8% of people from households earning less than $30,000 and 26.9% of people from households earning $31-80,000. The other key alert for the $31-80,0000 group was radio - 25% of this group learned about the disaster from radio, double the numbers of the other groups. The other notable difference occurred in the role of television as an alert source. Of the respondents reporting the highest household income bracket, 26.7% identified this source as their alert, 12.4 percentage points above the other groups on this source. None of the lowest income group found out about the disaster from news or weather websites, but respondents from this group were the only ones to report learning about the disaster from an agency website (9.1% of the group). News and weather websites were relatively under-represented as alerts across the groups: 12% of the highest household income group reported finding out about the disaster via this source, 9.5% of the $81-100,000 group and 9.6% of the $31-80,000 group. Figure 5.48, below, shows the alert sources for each household income group.

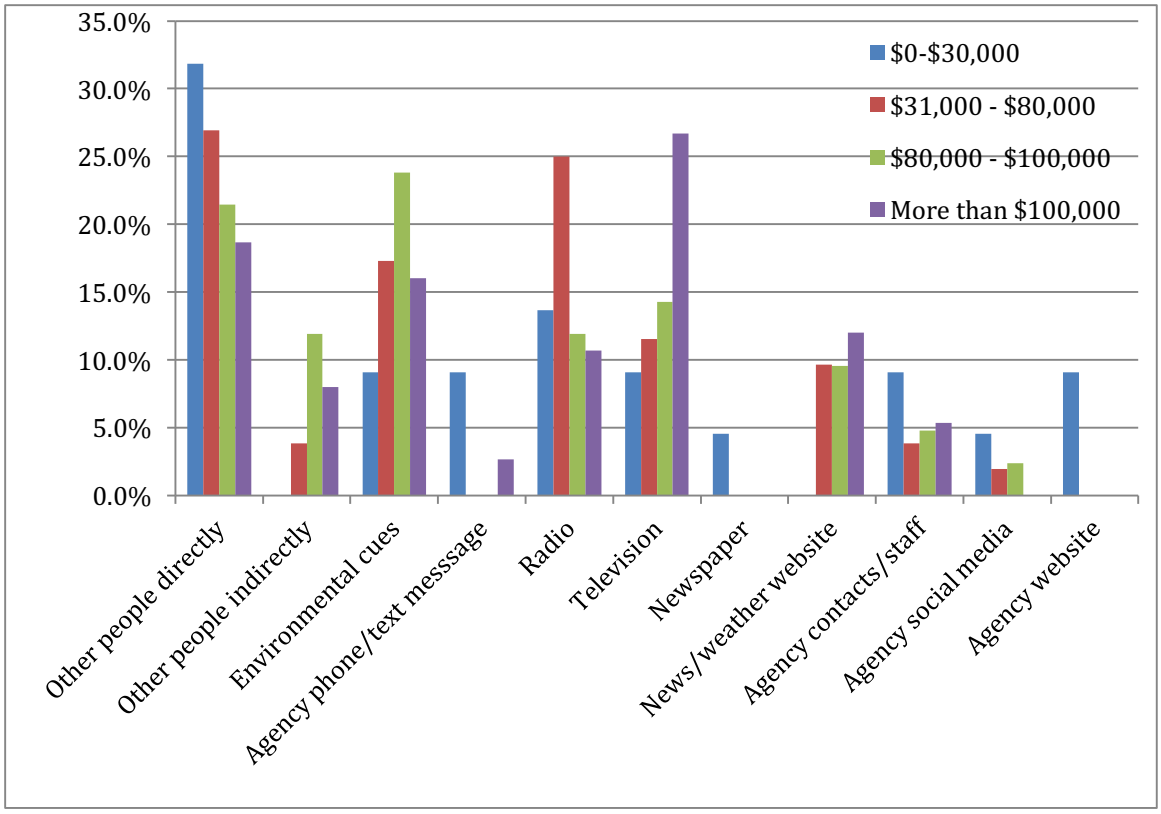



**Figure 5.48 Alert sources by household income group**

**The confirmation source:** The confirmation source by household income showed that news and weather websites were overwhelmingly the preferred confirmation source for all but the lowest income group. One third of the more than $100,000 bracket selected this as the confirmation source, 27.9% of the $80-100,000 group, and 34.5% of the $31-80,000 group. Just 4.5% of the group from households earning less than $30,000 nominated news or weather websites as their confirmation source. Instead, this group nominated radio and television (22.7% each) as their confirmation source, with other people directly as a third option (13.6%). Television was also a popular confirmation source for the $80-100,000 income bracket (23.3%). The chart below in Figure 5.49 demonstrates these points.

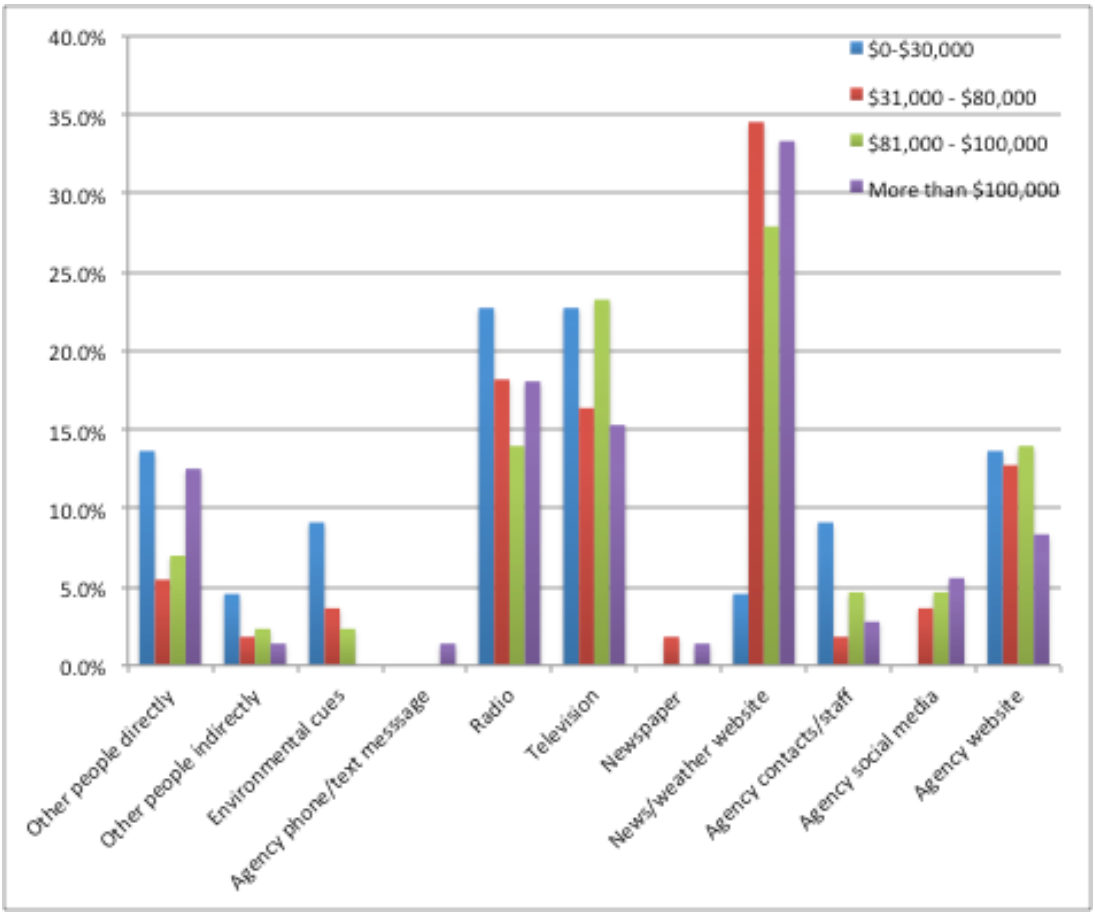



**Figure 5.49 Confirmation sources by household income bracket**

**Importance of sources:** The profile of source importance across the different household income brackets was similar to the confirmation sources, with radio, environmental cues, other people directly, television and news and weather websites making the top five. There were two small differences, however. The lowest income bracket followed the confirmation sources trend that saw web sources taking second preference to traditional media and more easily accessible sources. Agency contacts and staff were included in the top five, and news and weather websites ranked seventh in importance. Also, respondents from the $31-80,000 household income segment included agency websites in their top five, just ahead of environmental cues. The profiles are reported in the following four charts, Figure 5.50, Figure 5.51, Figure 5.52 and Figure 5.53.

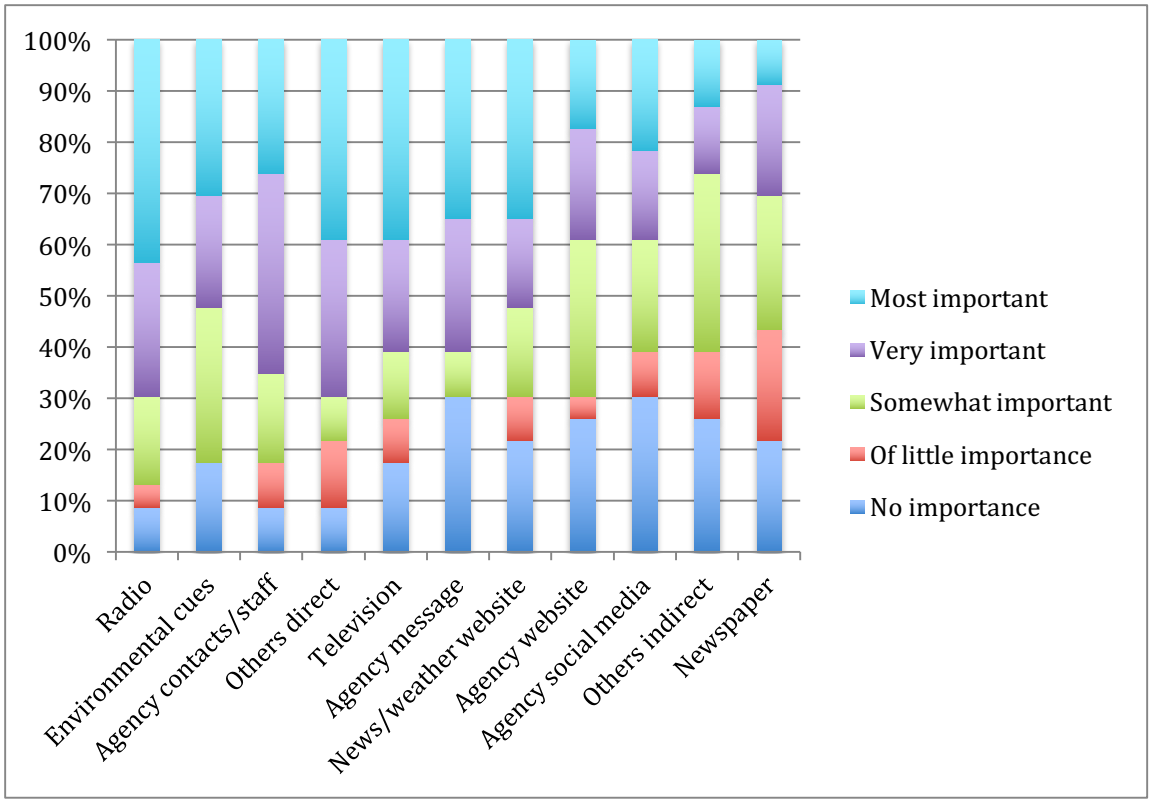



**Figure 5.50** **Importance of sources for respondents with a household income of up to $30,000**

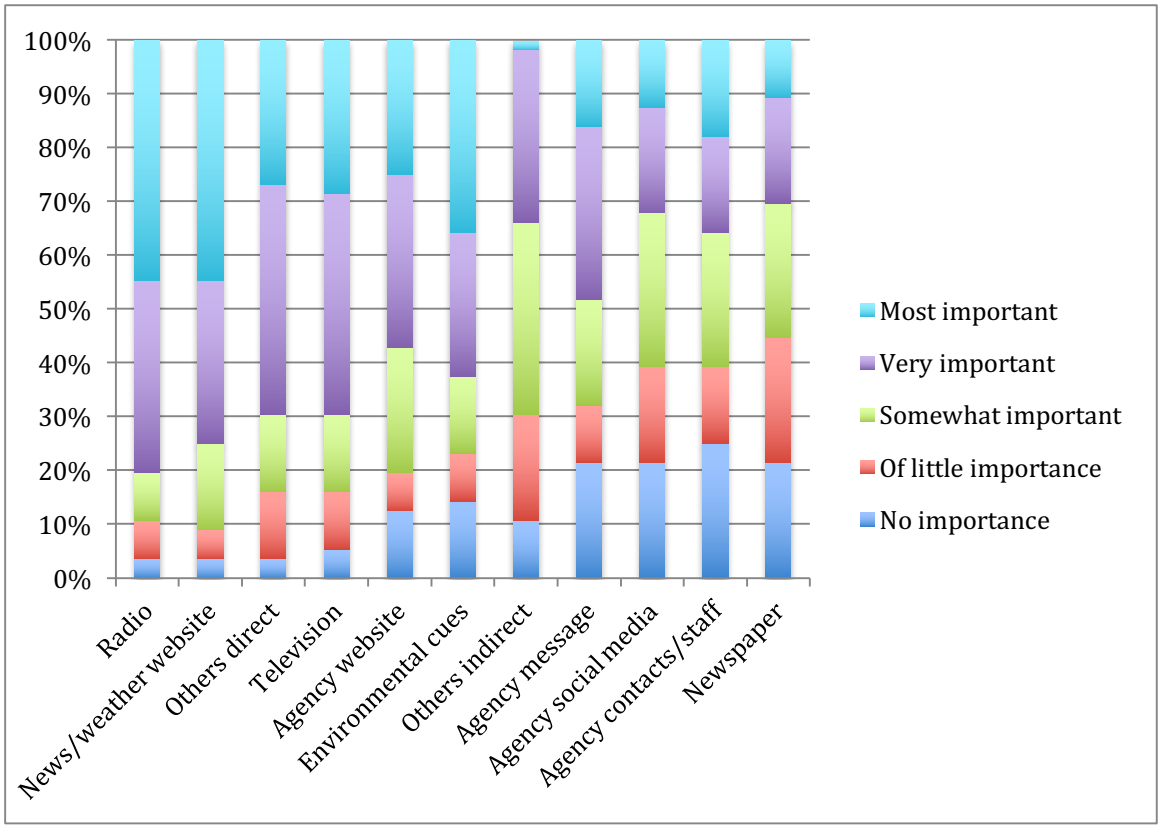



**Figure 5.51** **Importance of sources for respondents with a household income of $31-80,000**

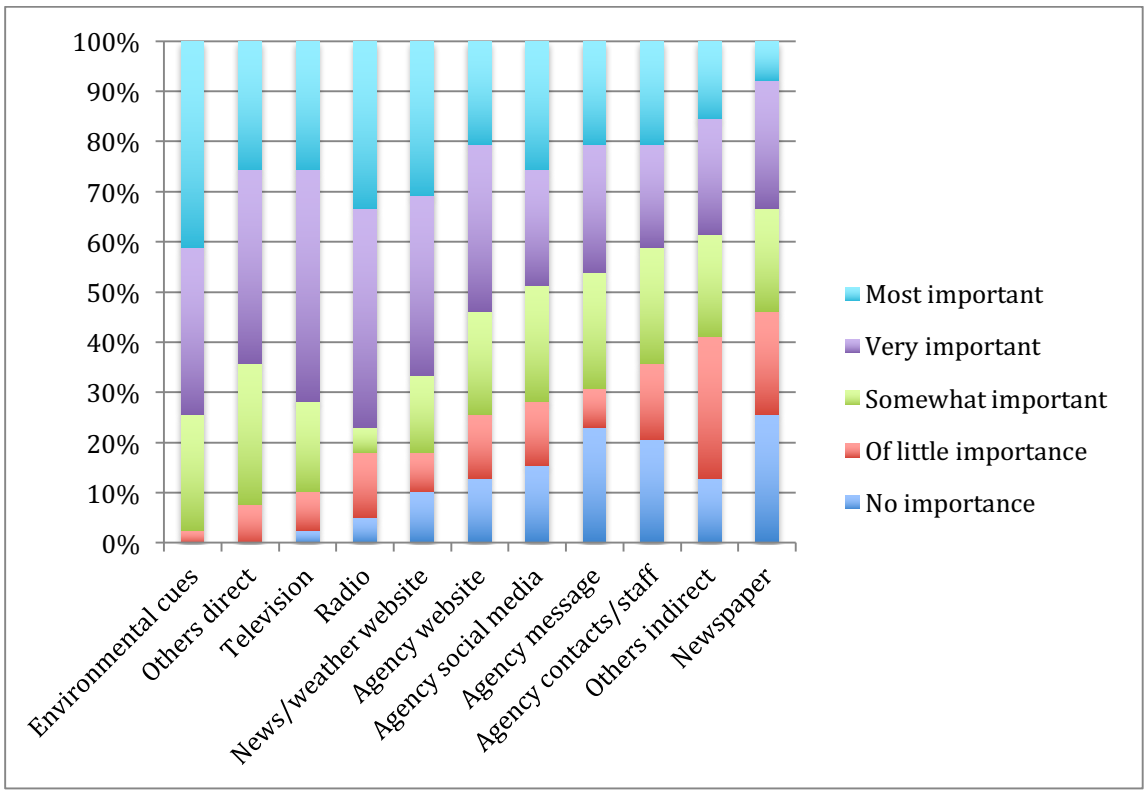



**Figure 5.52** **Importance of sources for respondents with a household income of $81-100,000**

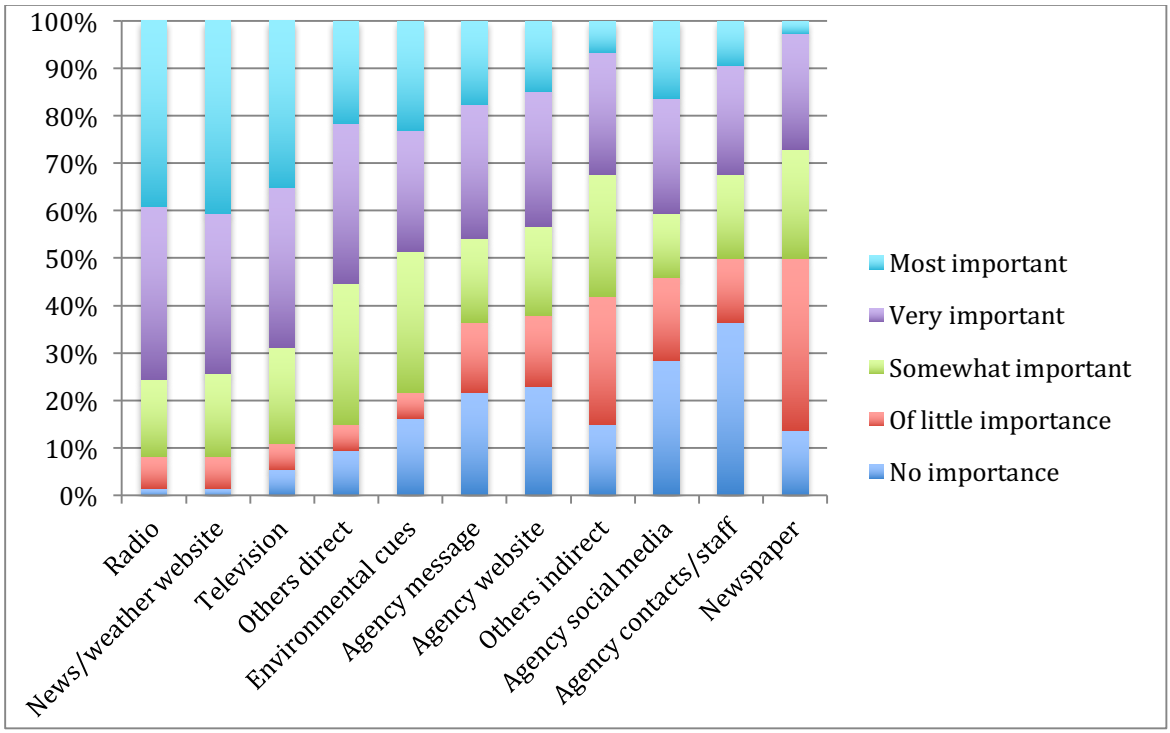



**Figure 5.53** **Importance of sources for respondents with a household income of more than $100,000**

#### 5.3.6.7. A summary of the analysis of factors that might influence source selection

The literature review revealed a large number of factors that might influence source selection and which were included in the disaster information seeking model, which was developed in Chapter 2. However, exploring each of them would have made the survey extremely complex, so a suite of demographic factors that provided simple measurement were included in the survey. These factors were age, gender, proximity to the disaster, social ties, household size, number of dependents, education and income. The data for each of these showed some differences in the information behaviour patterns between the subsamples of each factor. Even the two factors that were not established in the literature review to influence disaster behaviour, income and education, showed some differences that supported their inclusion in this list of factors. The survey was not designed for relationships to be established and generalisations to be made, but these differences have pointed to the need for these factors to be included in the model. Research designed to test the model developed over the course of this study can confirm or refute the legitimacy of their inclusion in the model.

### *5.3.7. Contact with family, friends and neighbours*

Respondents to the survey were asked to report how important to them a range of information sources was. Among these sources were two that related to other people: direct contact with friends, family or neighbours via face-to-face conversations or phone calls where people communicated synchronously by voice or text; and other people indirectly via email and social media. If respondents indicated that either of these two sources were 'somewhat', 'very' or 'most' important, they were also asked how the communication occurred. This question received 293 responses. The results are reported in Table 5.29 and show the prevalence of mobile phones in current disaster communication with mobile phone use of voice calls and text messages accounting for 59% of people using this means to contact other people during a disaster.

**Table 5.29 How people interacted with friends, family and neighbours**

| Contacting other people | N | % |
|---|---|---|
| Mobile telephone - voice | 127 | 43.34 |
| Landline telephone | 63 | 21.50 |
| Mobile telephone - text | 46 | 15.70 |
| Face-to-face | 38 | 12.97 |
| Social media such as Facebook or Twitter | 14 | 4.78 |
| Email | 5 | 1.71 |
| Skype or similar | 0 | 0.00 |
| **Total** | **293** | **100** |

This can be further examined by disaster type. Flood-affected respondents were more likely to use a wider range of tools to contact other people directly, predominantly mobile phones then landlines for each. Bushfire-affected respondents made more use of landline telephones than the other group apart from the earthquake-affected respondents, who numbered only two. Similarly with tornado, tsunami and mudslide – it was useful to look at the methods respondents used to contact other people, but with fewer than three respondents, it was difficult to make any comment on their source use. Figure 5.54 below shows the way people affected by different disaster types contacted other people.

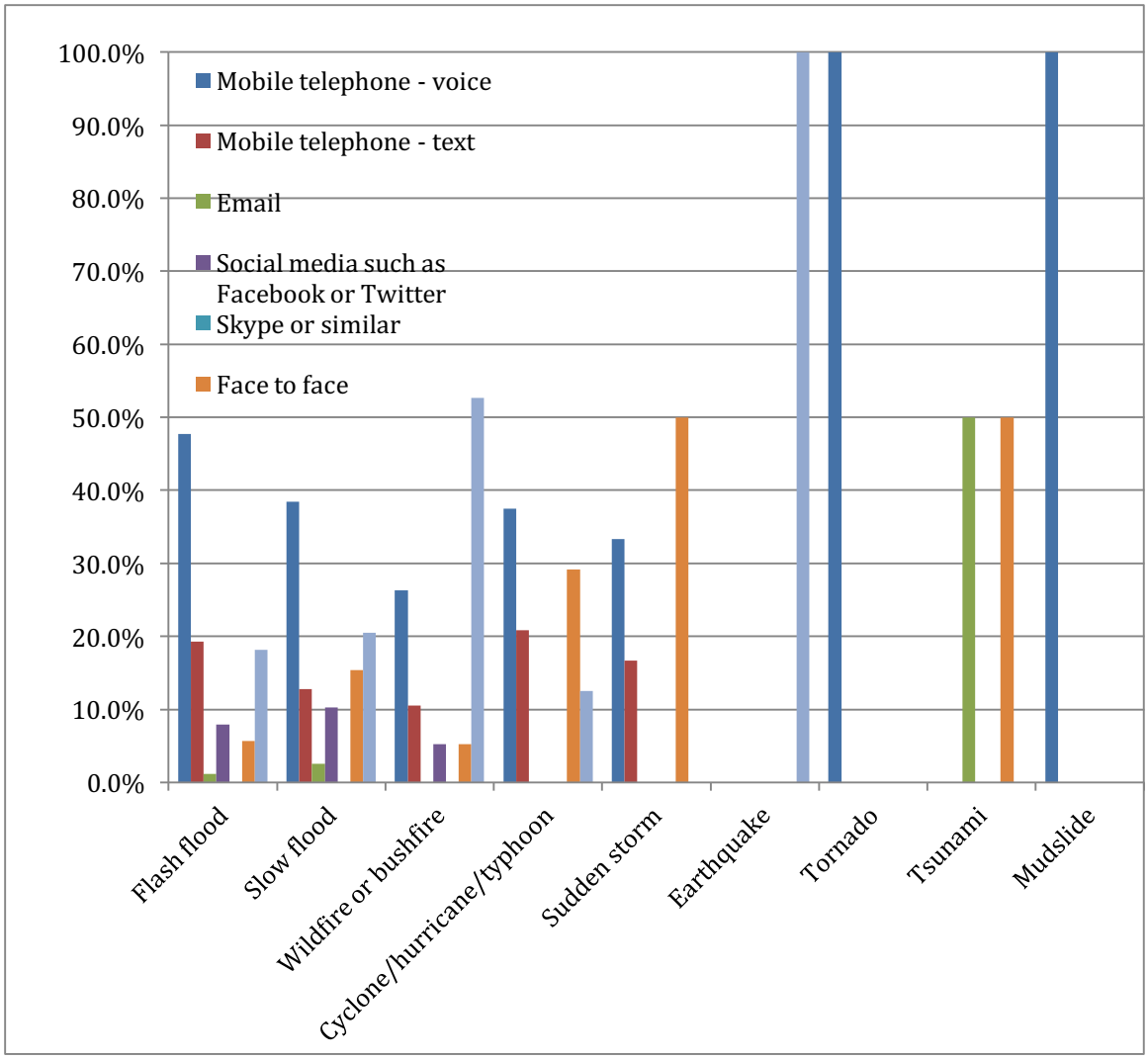



**Figure 5.54 How people interacted with friends, family, neighbours**

### *5.3.8. Time taken to look for more information*

Survey respondents were asked to report how long it took them to search for more information after they received the first alert. Their options were:

- less than one hour;
- 1-2 hours;
- 2-4 hours;
- one day;
- more than one day;
- more than several days; and
- not sure, can't remember.

Respondents to this question numbered 201. The results were linked to disaster type and are reported in Table 5.30. Two of the options, 'more than one day' and 'more than several days' received no responses and were deleted from the table. The other respondents reported mostly immediate information seeking activity, regardless of the disaster type and speed of impact.

**Table 5.30 The lapse of time from the first alert to looking for more information**

| | | <1hr | 1-2 hrs | 2-4 hrs | One day | + one day | > several days | Not sure | Total |
|---|---|---|---|---|---|---|---|---|---|
| **Flash flood** | N | 80 | 10 | 3 | 1 | 0 | 0 | 0 | **94** |
| | % | 85.1 | 10.6 | 3.2 | 1.1 | 0.0 | 0.0 | 0.0 | **100** |
| **Slow flood** | N | 35 | 3 | 0 | 0 | 0 | 0 | 1 | **39** |
| | % | 89.7 | 7.7 | 0.0 | 0.0 | 0.0 | 0.0 | 2.6 | **100** |
| **Wildfire or bushfire** | N | 21 | 0 | 0 | 0 | 0 | 0 | 0 | **21** |
| | % | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **100** |
| **Cyclone/hurricane /typhoon** | N | 24 | 4 | 6 | 0 | 0 | 0 | 0 | **34** |
| | % | 70.6 | 11.8 | 17.6 | 0.0 | 0.0 | 0.0 | 0.0 | **100** |
| **Sudden storm** | N | 5 | 0 | 1 | 0 | 0 | 0 | 0 | **6** |
| | % | 83.3 | 0.0 | 16.7 | 0.0 | 0.0 | 0.0 | 0.0 | **100** |
| **Earthquake** | N | 2 | 0 | 0 | 0 | 0 | 0 | 0 | **2** |
| | % | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **100** |
| **Tornado** | N | 2 | 0 | 0 | 0 | 0 | 0 | 0 | **2** |
| | % | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **100** |
| **Tsunami** | N | 2 | 0 | 0 | 0 | 0 | 0 | 0 | **2** |
| | % | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **100** |
| **Mudslide** | N | 1 | 0 | 0 | 0 | 0 | 0 | 0 | **1** |
| | % | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **100** |

Figure 5.55, below, provides a clearer picture of the time taken to look for more information in each disaster. The graph represents percentage of respondents reporting by disaster type. The large percentage of people seeking information straight away was common to all disasters reported in the survey. It also shows an unexpected result – even the slower moving disasters prompted a search for more information within a very short time of the initial alert.

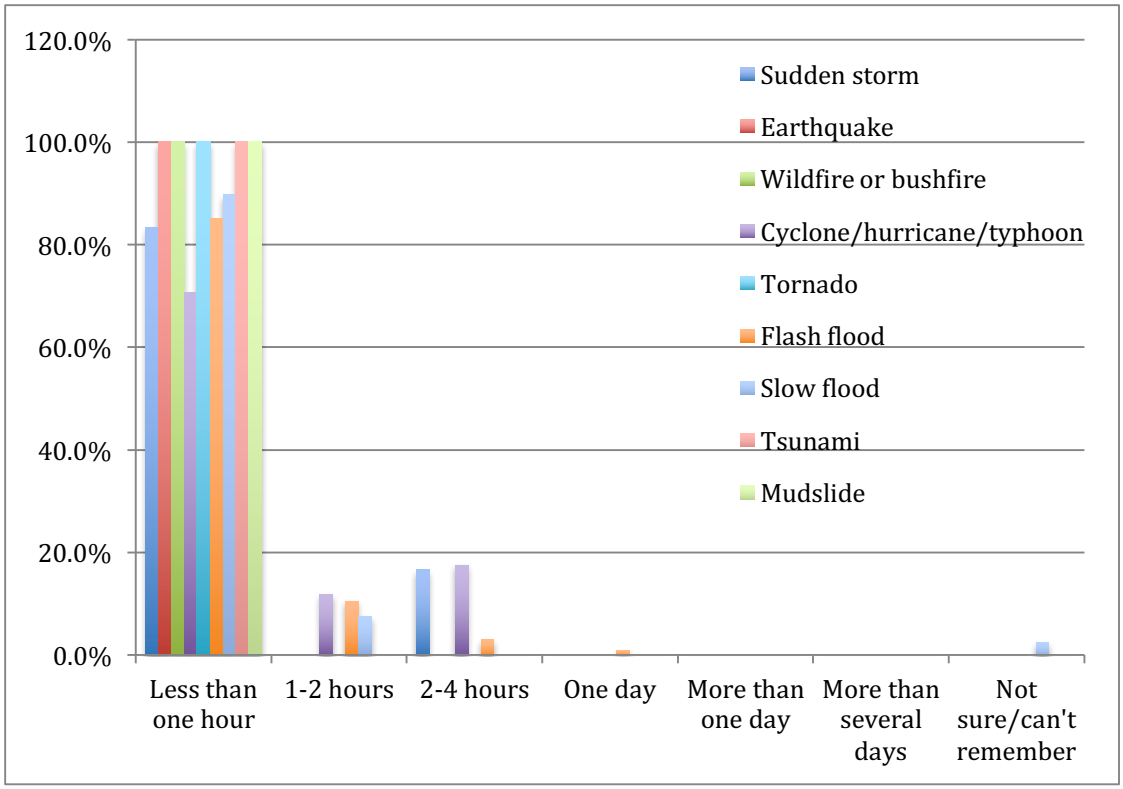



**Figure 5.55 Time taken to look for information after the first alert**

### *5.3.9. What people were looking for*

The question of what people were looking for was found to be extremely complex in the interviews and so this question, while considered important, was condensed to four themes: 'what has happened', 'what is going to happen', 'what should I do now', and 'what should I do next'. Respondents were asked to order these themes in terms of importance during their disaster information seeking. The most often reported sequence of preferences for information was:

1. What has happened;
2. What is going to happen;
3. What I need to do now; and
4. What I need to do next.

The predominance of this sequence could not be explained by instrument bias (the order in which the initial list was presented to respondents on the instrument), as the online survey software randomly changed the order of the selection for each respondent.

Table 5.31 gives the full results for this question, showing a clear pathway.

**Table 5.31 What respondents wanted to know**

| Order of priority | What has happened | | What is going to happen | | What should I do now | | What should I do next | |
|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % |
| **1** | 212 | 77.4 | 30 | 10.9 | 23 | 8.4 | 9 | 3.3 |
| **2** | 25 | 9.1 | 152 | 55.5 | 80 | 29.2 | 17 | 6.2 |
| **3** | 11 | 4.0 | 51 | 18.6 | 157 | 57.3 | 55 | 20.1 |
| **4** | 26 | 9.5 | 41 | 15.0 | 14 | 5.1 | 193 | 70.4 |
| **Total** | 274 | 100.0 | 274 | 100.0 | 274 | 100.0 | 274 | 100.0 |
| **Missing** | 74 | | 74 | | 74 | | 74 | |
| **Total** | 348 | | 348 | | 348 | | 348 | |

While not a component of the disaster information seeking model, what people want to know is an important driver of the information seeking process, and on reflection, should be considered in more depth in future research. It could affect the personalisation triggers identified by Mileti and O'Brien (1995; 1992), although the themes explored in this section were too broad and prevented meaningful ideas from developing from the data. In future survey research, this area should be explored in more depth to identify most useful information.

## 5.4. The effect of the survey results on the disaster information seeking model

### *5.4.1. First alert and disaster type*

There were differences between first alerts for certain disaster types, which demonstrates that a slight alteration needed to be made in the model. Overall, (and for each disaster type) first alert sources were spread across a small number of sources and forms from which the top three or four in each disaster were also reported. Other people directly (face-to-face or with via voice or text conversations on the phone) was most prevalent at 22.6% of the sample, with television as first alert source on 18.1%, then environmental cues on 17.1% and radio on 15.6%. From this point, all other alert sources and forms dropped below 10% of responses.

Looking at the data by disaster type, 25.3% of flash flood respondents (n=95) learned of the disaster by direct contact with other people, 22.1% reported learning about the disaster from environmental cues, and 14.7% learned via television. In slow flood (n=42), television was the most prevalent first alert source (28.6%), then radio (23.8%) followed by direct contact with other people

(16.7%). In cyclone (n=31), news or weather website was the primary first alert (30.3%) and radio next (24.2%). Television was on a par with radio on 21.2%. Each disaster type seemed to have a clearly different alert process compared with others. This means that the place of the disaster type in the model will need reconsideration, as its current place in the model does not allow for the influence of disaster type on this first step of the information behaviour pathway.

People with no disaster experience reported how they thought they might be alerted to a disaster, and their ideas were very similar to the reported experiences of those who had been through a disaster. However, the inexperienced respondents did underestimate the importance of environmental cues to the way they would become aware of a disaster.

The survey data showed that there were definite clusters around certain information sources for certain types of disasters. The first alert remains a discrete and important component of the model that shows a relationship to disaster type, and should also be retained as a separate feature of the model, but the survey also clearly showed that disaster type can affect the way people get information starting with the alert source. This means that the place of disaster type in the model needs to change in relation to the alert source to reflect disaster type's influence on the very first step of the information seeking process during a disaster. To do this, disaster type should sit outside the information seeking loop as an influence, rather than part of the process. The alert source will take its place within the information seeking loop. A potential additional benefit of doing this, and something that was not examined in the survey, was that the feedback loop could then allow information seekers to return to their alert source for further information in the information seeking process. This change will be illustrated in the final version of the model.

### *5.4.2. Factors that influence source selection*

The factors that influenced source selection were thought to be filtering mechanisms for information seeking behaviour described by the disaster information seeking model. While the survey could only study a few of the possible influences that were identified in the literature review and the interviews, those that were surveyed showed that there was high likelihood that each could influence the type of information sources used by information seekers. Differences in information seeking behaviours were identified between age groups, genders, household sizes and people of different levels of education.

The location of people in relation to the seat of the disaster was also found to potentially influence how people received information. Much smaller differences were found between people on different income levels and people with different numbers of dependents, but the similarities were not consistent enough to discard these two factors as influences on selection of sources. Eventually these influencing factors should be tested.

### *5.4.3. Source horizons and source sequences*

The survey approached the need to establish at least the start of a range of source sequences by asking about the first alert, then by asking respondents to identify the source that they turned to on receiving this alert. This confirmation source was measured and analysed, so at least the first two steps in the source sequence could be reviewed. Overall, the most prevalent first alerts for disaster experienced respondents were other people directly (synchronous methods such as face-to-face, phone call or text, n= 45, 22.6% of the sample), environmental cues and television (n=34, 17.4%) and then radio (n=30, 15.4%). The most prevalent confirmation sources were news or weather websites (n=59, 30.2%), followed by radio (n=34, 17.4%) and television (n=32, 16.4%). The most prevalent information pathway starts with other people directly as the alert, then confirmation via a news or weather website (n=17, 8.7% of the total experienced sample). The second most prevalent pathways were other people directly for the alert and then television for the confirmation, and television as the alert and then a news or weather website for confirmation (both n=13, 6.7%).

This process was also undertaken by disaster type. The most prevalent information pathways were:

- flash flood – other people directly then news or weather website;
- slow flood – television then news or weather website;
- cyclone – news or weather website then news or weather website;
- bushfire – environmental cues then agency website;
- storm – other people directly then television or radio;
- earthquake – environmental cues then other people, radio or emergency agency staff;
- tornado – television or news or weather website, then other people or environmental cues;

- tsunami – other people directly or news or weather website, the radio or agency website; and
- mudslide – other people directly then news or weather website.

Each of these pathways can be explained by the disaster information seeking model developed in Chapter 2 and refined in Chapter 4. In addition, the survey results supported the initial findings in the interviews for flash flood, slow flood, cyclone and bushfire. These two factors support the retention of the source sequence component of the disaster information seeking model.

The survey asked respondents to rate the importance of each source they used during their disaster experience. This component of the model allowed information sources to potentially be allocated to a source horizon of most important sources, secondary sources and marginal sources, in the way the model shows the suite of sources. These were effectively measured by the importance questions. The survey data overall and consistently for disaster type and demographic features of respondents showed that the most important sources were radio, television, news and weather websites, environmental cues and other people. Secondary sources were consistently agency phone or text messages, agency websites, agency social media and agency contacts. Other people indirectly and newspaper were consistently of marginal importance, although there was some interchange into the marginal importance category by agency messages, agency social media and agency websites in the disasters types that had very few respondents such as storm, earthquake, tsunami, tornado and mudslide.

However, the questions aimed at establishing the sequence of sources that respondents used did identify that the confirmation source was more important as a step by itself than originally presented in the model, where it was part of the sequence with no weighting of importance attached to any stage of the sequence. It would be recommended that the first stage of the source sequence be identified as the confirmation source, giving it slightly more gravity than the subsequent steps in that sequence of information sources.

### *5.4.4. Feedback loop*

The survey was not able to measure activity that reflected the feedback loop on the model. Returning to previously-visited sources might be reflected in the source horizons stage of the model, where importance may indicate multiple visits, but the instrument could not directly measure return visits. No changes will be made to the feedback loop, but its presence and effect should be considered in further research.

### *5.4.5. Time*

This aspect of the model was introduced after the interviews because of the constant references to time by the interview respondents in relation to the time they had available to them and the time the disaster was expected to arrive or did arrive. This perception of compressed time that became evident in the interviews was also evident in the survey, in the responses to the question about how long it took respondents to look for more information once they learned of the approaching disaster. Even in the slow moving disasters such as cyclone and flood, where communities often have days of warning, respondents said they looked for more information within one hour of learning of the disaster. This legitimises the inclusion of time in the disaster information seeking model.

## 5.5. The amended model

The survey data confirmed the legitimacy of including each of the model's components, with the exception of the sense-making loop. One change was made as a result of the survey, and that is to place disaster type outside the information seeking pathway as an influence on the process rather than a step within the process as it was represented before the survey. The alert source will become part of the information seeking process and will be influenced by the disaster type in the model. Some of the factors that were thought to influence source selection were shown in the survey to be an important component of the model, justifying the inclusion of those examined in the survey plus a range of other potential factors for later testing. The zones of importance discovered in the survey reflected the source horizons first proposed by Savolainen and included in the disaster information seeking model. In addition, source sequences were examined, although these could not be considered beyond the first two sources because of the threat of making the survey too complex. This problem of complexity prevented close examination of several of the model's components,

including influences on source selection, source sequences, and the feedback loop.

The suggested change to the disaster information seeking model is illustrated in Figure 5.56 below.

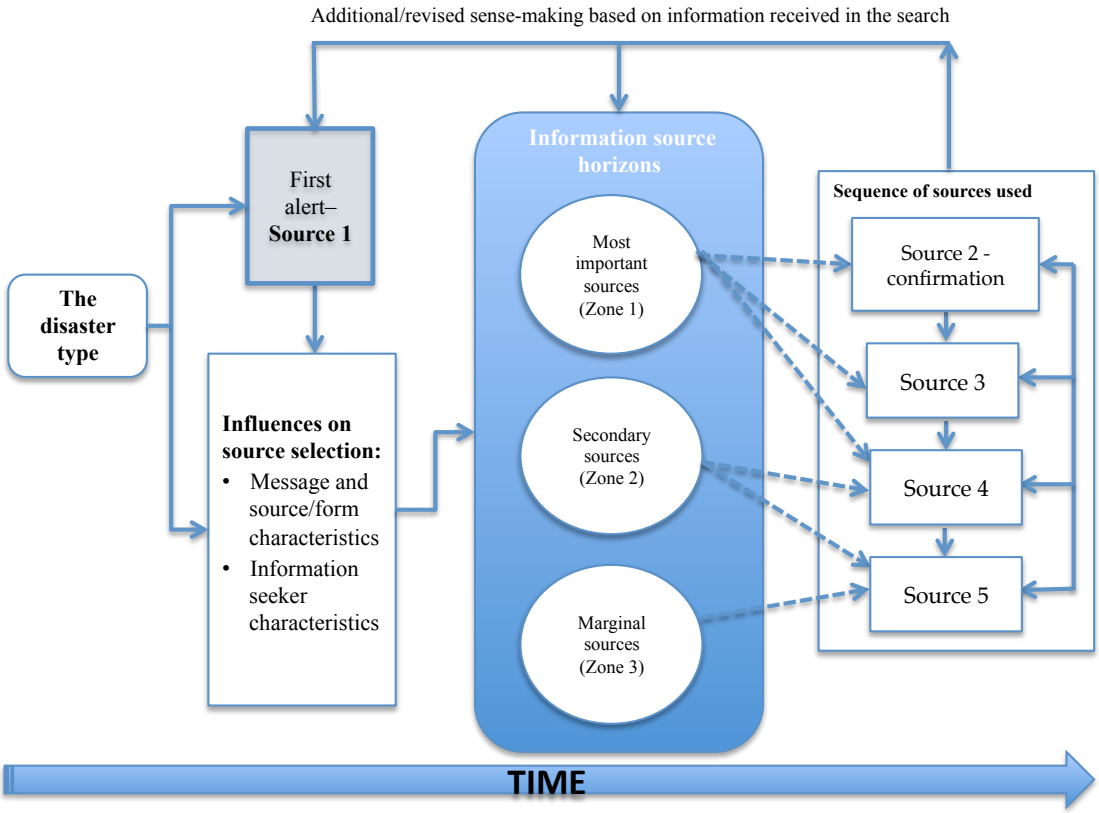



**Figure 5.56 A revised disaster information seeking model, with changes made after consideration of survey data**

This new version of the disaster information seeking model was then presented to a focus group of disaster communication practitioners and researchers for validation, with the details and results reported in the next chapter.

## 5.6. Summary of phase two: the survey

This chapter described the development and implementation of a survey that was designed to investigate what form information seeking activity takes in a disaster and whether each component of the disaster information seeking model was a legitimate inclusion in the model. The survey's key contribution to this thesis was the confirmation that disaster type has an effect on disaster information behaviour, and therefore of 'disaster type' requires prominence in

the process illustrated by the disaster information seeking model established in Chapter 2 and then refined in Chapter 4 during the interview phase. The survey produced extremely rich data relating to source sequences, which showed information seeking patterns in disasters overall, and types of disaster specifically. Once change was made to the model as a result of the data analysis – disaster type was positioned to reflect its influence on the alert source, and this brought the alert source closer into the information seeking loop.

The next chapter will describe the focus group of a group of industry practitioners and researchers, which investigates whether the disaster information seeking model is valid. The next chapter will also describe the development of the final version of the model.

# 6. Phase three: focus group

The previous two chapters described the results and analysis of the semi-structured interview and survey phases, and the application of these to the disaster information seeking model. This chapter will explain the results of the focus group held with six disaster communication practitioners and researchers. It will also detail the outcomes of the focus group. The details of the focus group respondents and process were reported in Chapter 3, the methodology section. This chapter will follow the structure show in Figure 6.1.

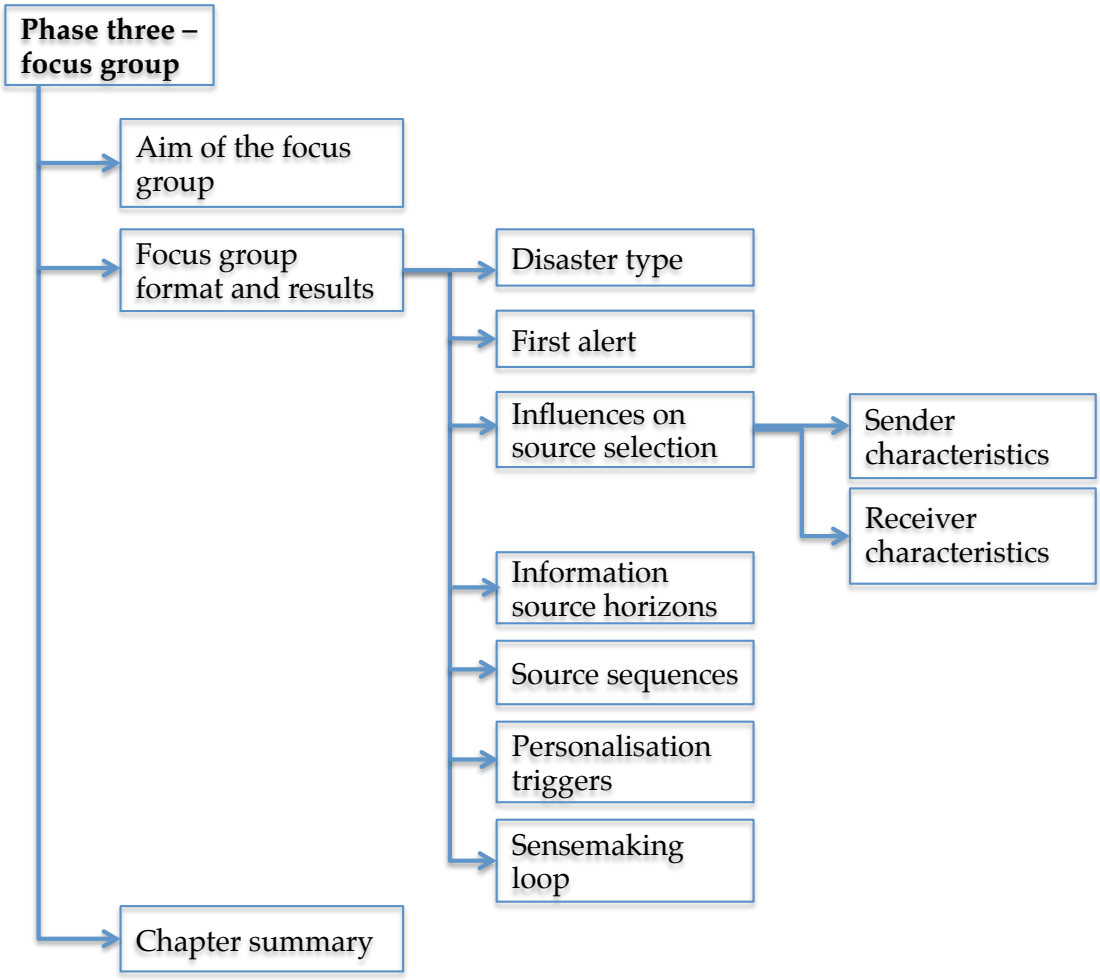



**Figure 6.1 Format for discussion about the focus group**

## 6.1. Aim of the focus group

The aim of this focus group was to determine if the disaster information seeking model would be useful for practitioners in explaining information seeking behaviour in disaster. The model reviewed by the focus group was developed from the literature review and then refined at the interview and survey stages. It is reproduced in Figure 6.2.

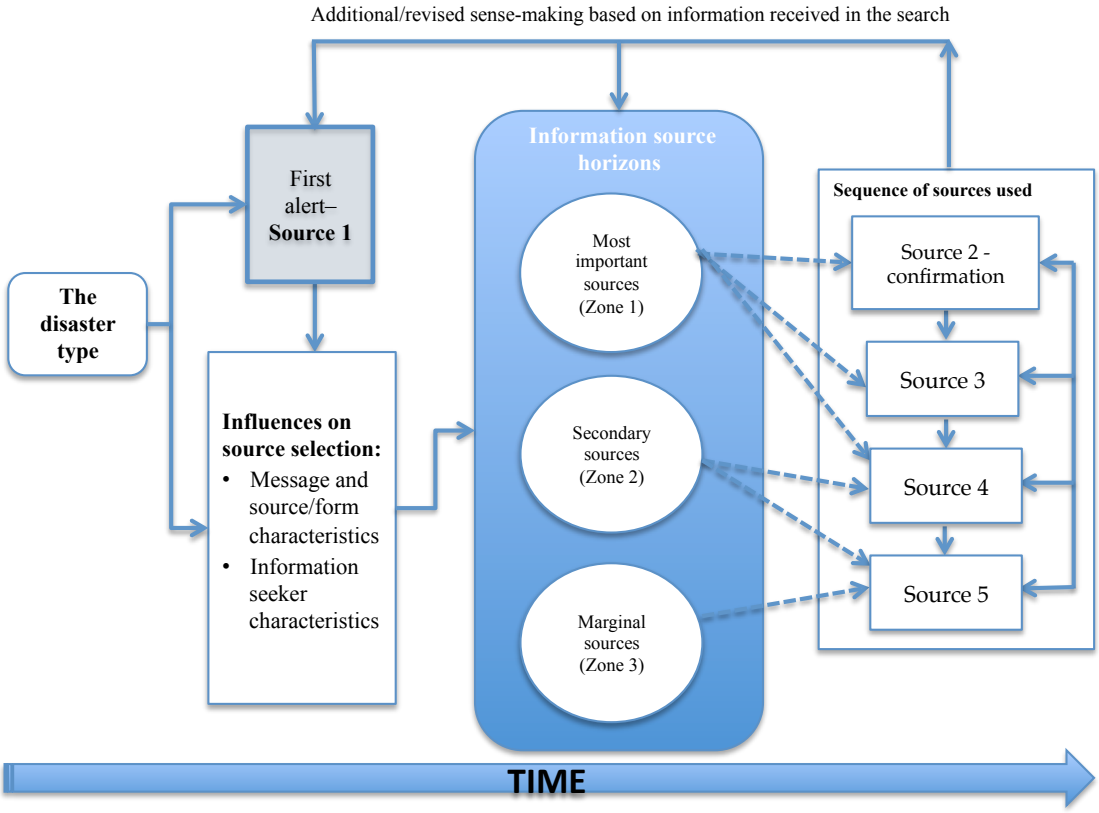



**Figure 6.2 The disaster information seeking model resulting from a literature review, interviews and a survey.**

## 6.2. Focus group format and results

Four disaster communication practitioners, one practitioner/researcher and one disaster communication researcher attended the focus group. As described in Chapter 3, the focus group, four of the participants were experienced in slow and

flash flood, cyclone, storm, bushfire and hazardous chemical disasters. Two were disaster researchers from the United States and Australia. Of the six, five were focused on response, while one worked in disaster recovery. All were aged between 40 and 55 and together represented 45 years disaster management experience.

The focus group considered each component of the disaster information seeking model, starting with the first alert, disaster type, then working through influences on source selection, channels and sources, the zones of importance, sequence of sources and the feedback loop. This section will outline the results in the same order.

A number of key points emerged from the focus group and will be discussed in detail later in the chapter:

- the disaster information seeking model as it was presented to the group was thought to be too linear, and did not accommodate the circular nature of information seeking despite the inclusion of the feedback loop;
- all of the components except the source sequences were endorsed by the group; the source sequence component was considered not useful and participants suggested it be replaced with a mechanism that could help discovery of what people were looking for;
- the group considered the influences on source selection would affect every aspect of information seeking behaviour, not just source selection.

Focus group participants referred to the influencing factors as 'filters'. The model was also found not to have a mechanism that would accommodate people who did not seek information following the alert to a disaster in their community. Additionally, participants thought the personalisation process and trigger for action would be an important inclusion, in fact, a raison d'etre for the model. Each of these aspects will be considered in more detail in this chapter, and a diagram created that represents the disaster information seeking model accounting for the results of the focus group.

### *6.2.1. Disaster type*

Respondents were divided in their thoughts on the influence of disaster type on information seeking patterns, but one dominant point of discussion revolved around their belief that the differences might occur not by specific disaster, but between 'rapid onset' and 'slow onset' disasters.

> *I don't think you need to think specifically about different types of disasters as such, but think in terms of rapid onset, slow onset. I think that's a big thing about a fire like the Blue Mountains, which races up Megalong Valley, fuelled by fantastic eucalypts, it's going to race a million miles an hour, as opposed to a more Queensland type fire, where it can burn for weeks and nobody even notices it's there; floods, flash floods in Toowoomba, versus Grafton-style floods where you don't know it's coming, or Murrumbidgee plain floods, where you know it's coming for six weeks. So I would put in the filter in terms of rapid onset, slow onset, I think would be in terms of theoretical knowledge, a useful way to think about it (FG2).*

A recurring theme associated with this was the different neurological processes in high and low stress situations and how that might affect information seeking patterns. However, one respondent believed that there were differences in information seeking across specific hazards rather than the typology presented by other respondents. She believed that disaster behaviour would be influenced as much by situational factors as by disaster type (FG1):

> *I would say there is probably some hazard-specific stuff, because if it's a fire, I will ring my brother, who is in the CFA* (Country Fire Authority in Victoria)*, there is no good ringing the CFA if it's a flood…*

The respondents agreed, however, that disaster type could affect the form and channel that people receive their first notification of a disaster. FG3 described a bushfire that he had worked on at Winmalee (near Sydney) in the Blue Mountains in 2014 where most people learned of the fire by seeing the smoke and getting news from their neighbours. The focus group members felt that this fire example showed one of the situational factors that influences behaviour in response to that first alert, with a very tight link to disaster experience (FG3): "I think that's a really big factor, that connection with the actual hazard". FG2 explained that people living in a cyclone area would have established patterns of information seeking that would alert them at the earliest moment to a cyclone, but the same information seeking would not alert them to a bushfire, which is a type of disaster outside the experience of most people living in the tropics.

This discussion of interaction between disaster type and situational factors that influence source selection pointed to a change in the way the model was presented in order to show the relationships between these groups of factors. It

also points to disaster type – either specifically or by some other classification – being a factor that influences source selection in the information seeking process. Graphically, this might be represented as in Figure 6.3 below. A less linear design helps to convey the complex inter-relationships between all of the factors influencing disaster information seeking behaviour.

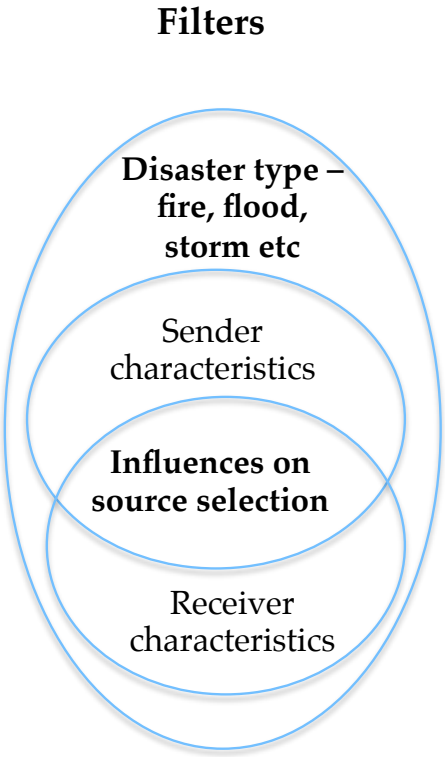



**Figure 6.3** **Addition of disaster type accommodates its relationship with other factors that influence the role of form and source in alerts**

### *6.2.2. The first alert*

The first alert appeared in the post-survey version of the model as influenced by disaster type and part of the information seeking loop created by the remaining components of the model. It had been the first element of the information seeking process, and the trigger point at which it starts (Mileti 1999; Mileti & Peek 2000), but in fact, the disaster and the disaster type were shown by the survey to be triggering and influencing factors on the first alert. Through the interview and the survey stages, the first alert was considered a factor outside the model that triggered a chain of events, whether it was information seeking, acceptance of the situation and no action, or action in response to the disaster. Following the survey, it was brought inside the loop and the trigger point considered to be the

disaster, the type of which then influences the alert source. In the literature found for this study, the influence on realisation of danger for the community or the individual was assumed to be the alert source, when in fact it could be the disaster type which in turn influences the alert source.

The focus group participants confirmed this assumption, as the first alert it was, in their experience, the trigger for either information seeking or for action. FG1 commented: "So I think the inclusion of the alert is really important, because that, depending on what the alert is and how it as come to them is probably going to have a bearing on how the rest of the model works."

From the first minute of the focus group, the respondents grappled with the influence of situational factors over each component, starting with the first alert. In the model, the disaster type was the only factor that might have influence over the first alert. Going into the focus group, it was thought that the disaster information seeking model considered that influences on source selection (the sender and receiver characteristics) had an effect after the first alert stage. However, the group, considered situational factors as having a key effect on the form and source of the first alert, which confirmed what was discovered in the literature (such as Eisenman et al. 2007; Kuppuswamy 2014; Meyer 2010; Mileti 1995; Sorensen & Vogt Sorensen 2007; Trumbo et al. 2011). This exchange demonstrated the discussion on this topic:

*FG1:* *And as you know, it is very dependent upon demographics, upon culture; there is a whole lot of factors in there that will affect how people will look at a particular alert.*

*FG2:* *There is almost a filtering process on that first arrow isn't there?*

*FG5:* *It would also* (be affected by) *the time you receive the alert, what you are doing and the actual message itself – I don't see that anywhere in the model, but what the alert says, how well it is interpreted etc.*

Factors such as trust in agencies, the availability of media, the strength of the individual's community networks, were all considered by the group to have some influence on how people would get a first notification that a disaster threatened their community and their subsequent behaviour. This was had been earlier discovered in the literature (Mileti & Fitzpatrick 1992; Paton 2007) (Leik et al. 1981; Taylor, K. et al. 2009) and confirmed in the interviews. FG3 used the example of the Winmalee bushfires:

> *…if I use the example of the Blue Mountains bushfires* (Winmalee, 2014), *we know the majority of people found out by those visual cues, the smoke and the air, the neighbours and so-on – the formal alerts were very low down on the list, mainly because of the speed with which it was travelling, but it was a bit of a wake-up call for us, because we thought that everybody found out by text message…*

This pointed to a change to the model to factor in the influence of situational factors over the form and channel of the first alert, and this has been built into a new version of this component of the model, represented in Figure 6.4. The sender characteristics and receiver characteristics were represented as interlocking circles that achieved some overlap; and the first alert was moved to the point inside the cluster of circles where each of the circles touched, thereby indicating influence of these factors on the first alert form or source.

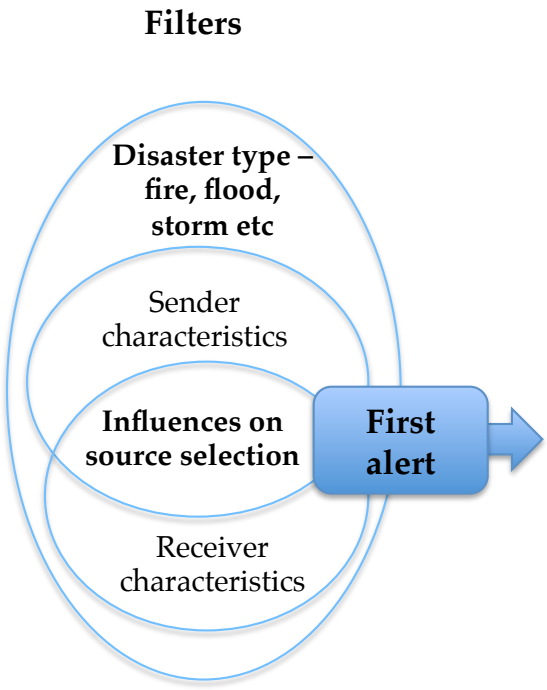



**Figure 6.4** **Revised disaster information seeking model component accommodating the influence of situational factors on the selection of alert source and form.**

The discussion by the focus group on the alert source confirmed the importance of this component of the model, and also confirmed that external influences determined what this source might be. Disaster type was considered a significant influence on the source type, and situational factors were also

considered important in determining how a person might learn of a threat to themselves or their community. The discussion resulted in a realisation that the disaster type and situational factors such as receiver and sender characteristics affected the alert source and the subsequent selection of sources, and this necessitated taking a different graphical view within the model to demonstrate these relationships.

### *6.2.3. Influences on source selection*

At this point, focus group respondents turned the discussion to the factors that influence each aspect of disaster behaviour, what they called situational factors and what is termed in the model as influences on source selection. The influences on source selection in the model were discussed in some depth in the focus group. As each element of the model was reviewed by the group, influences on source selection emerged. Receiver characteristics were dominant, but sender characteristics were also covered. In some cases the participants linked factors from both groups, so while an attempt will be made to present the influences methodically, there will be crossover between the two groups of characteristics.

#### 6.2.3.1. Sender characteristics

The focus group briefly discussed form and sources, and throughout the focus group they made a distinction between the two as they covered other topics. Overall, they believed the source was an important factor in the selection and assigned importance of information, but they recognised that sometimes there can be blurred lines between form and source. FG2 said:

> *…you, as an agency spokesperson, almost become a commentator on the Weather Channel, even though they are seeing Weather Channel as a source, and yet they got government spokespeople appearing on there, so the source of information is not the channel we are appearing on, it's the agency, but you just happen to be appearing on Weather Channel.*

The difference between the two was confirmed by one of the researcher participants who had discovered a legitimate case for differentiation (FG5): "My research team, we looked at the source – government, friend, family, neighbor – and then the form – social media, traditional media." They had found that receivers made the differentiation between the two (Liu, Austin & Jin 2011), and

therefore it would be important for future research to make the same differentiation.

Influences on source selection were also mentioned here as affecting form and source, with most of these references to 'trust' and 'trustworthiness' of agencies. This was confirmed in the literature (Griffin et al. 2008; Lee & Rodriguez 2008; Mileti & Fitzpatrick 1992; Paton 2007; Sherman-Morris 2005). These characteristics were linked to the receiver characteristics of disaster experience and experience with a specific agency:

> *"…it depends on the degree of trust that you have in the source of that informational alert, so if it's one of the agencies and you had really good experiences with them you would be able to say "OK they're good guys, when they say 'x', it means that 'x's is going to actually happen…" (FG1).*

Other sender characteristics that were discussed were source and form credibility, availability, and frequency of messages, all of which were subject to studies by Mileti and his colleagues (1995; 1992; 1992; 2000).

#### 6.2.3.2. Receiver characteristics

Cognitive ability was a factor considered by the group as an obstacle to allowing the community to make safe decisions. The model was discussed in the context of tools that could help agencies do their job better. This crossed over with the sender characteristic, message accuracy:

> *If they are not hearing us because of fear, how can we diminish that fear so we can get them to listen, or if they are not getting accurate information because they are relying on somebody else, how can we ensure they get that accurate information (FG2).*

Culture and socio-economic status, past experience with evacuations and specifically not being allowed back onto property for extended periods, community experience with specific disaster types, age, resources, self efficacy (part of locus of control and resources), gender, were also named as influences on disaster and information seeking behaviour by the group participants. The focus group discussion confirmed the literature review findings of the influence of receiver characteristics in disaster information seeking, and confirmed the importance of receiver characteristics to the disaster information seeking model.

### 6.2.3.3. The importance of influences to the model

A significant theme to emerge from the focus group was the opinion that the influences on source selection were actually influences on every aspect of disaster information seeking behaviour, from the initial alert through the sensemaking processes, into confirmatory behaviour and then resulting further information seeking, conscious inaction, or protective action.

> *I actually see all of these things apply to every part of it, including the response, that's probably where it is most telling, people put their rose-coloured glasses on and depending on all of the bits earlier (referring to the situational factors that make up the influences on source selection), will make decisions based on that (FG3).*

While this was the view of one participant, his opinion was reflected in the comments of others through the session. *"…we all have our own filters depending on who we are, what we are, how ready we are, how sick we are, whatever…" (FG2); "…that's what I was thinking when I was looking at the model, I was thinking, 'yeah, but it all depends'" (FG1); I think it* (influences) *would be a circle or a fuzzy line around the entire model…" (FG5).* This led to a conclusion that the element "influences on source selection" should actually be called "influences on information seeking", retaining the two Mileti, Sorensen, O'Brien and Fitzpatrick classifications (1992; 1992; 1990) that incorporated sender and receiver characteristics.

Secondly, the experience of focus group participants showed that there would be merit in separating form from source to make the model more applicable to practice. This had been mentioned in the literature (Liu, Austin & Jin 2011), but not taken on board in developing the model until now, following the validation of practitioners. These two changes might appear in the disaster information seeking model the following way, with the influences on source selection, or filters, as they were called in the focus group. They are illustrated in Figure 6.5.

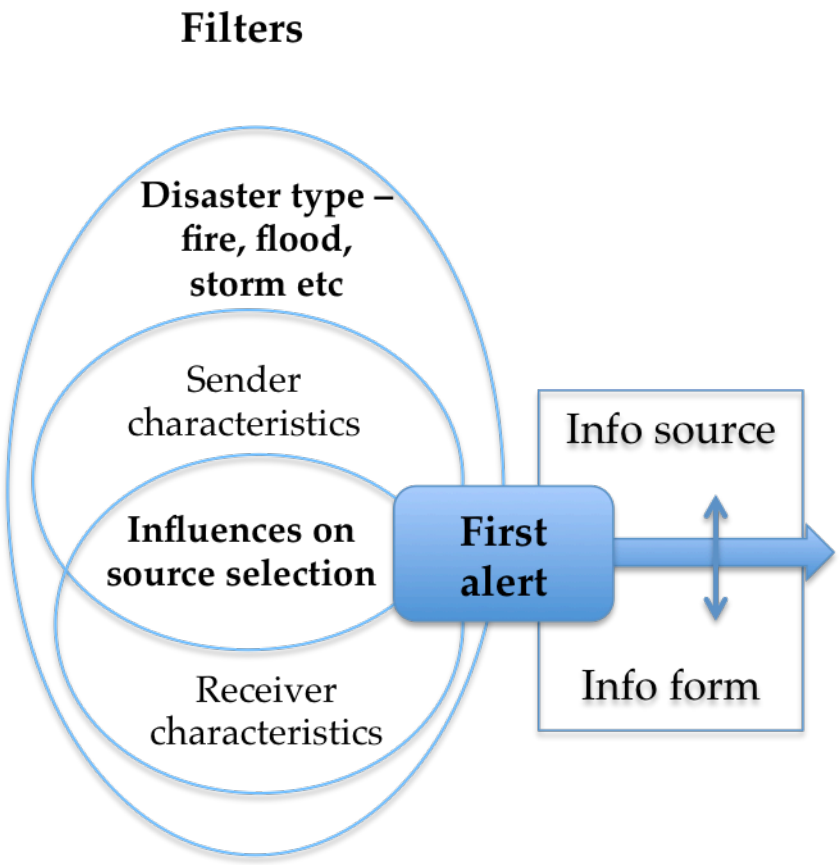



**Figure 6.5 Separation of form and source, and changes to influences on information seeking**

Three significant points emerged from the focus group discussion on influences of source selection. The first was confirmation that influences were at play in the way individuals and communities reacted to a disaster. However, the second point to emerge showed suggested that its impact was not on source selection, but on every aspect of the model, from the first alert to subsequent sources and sensemaking. Finally, the focus group crystalised an idea that emerged from Liu, Austin and Jin (Liu, Austin & Jin 2011) that form and source should be separated in future research so that differentiation could be made between the source and the channel that carried that source's message.

### *6.2.4. Confirmation source*

The focus group was asked to comment on the confirmation source during the discussion on source sequences. The overall recommendation of the group was that knowledge of source sequences was not something practitioners needed, and this will be discussed later in Section 6.2.6 Source sequences. In discarding the idea of source sequences though, the confirmation source would also be

discarded, despite recognition in the literature review that this element of the model was important. In addition, the confirmation source in the interview phase held a pivotal place for disaster-affected communities as the information source that allowed information seekers to determine the relevance of the disaster to them. In the interviews, the confirmation source usually triggered further information seeking, but was also a trigger for inaction (the disaster is not relevant to me yet) or action (I need to leave/help). In addition, despite discounting the source sequence section of the model, the focus group respondents referred consistently to second sources in their use of stories to illustrate their points: "and then you would…" or "…and then they went to (x)". These references revealed that knowing more about the confirmation source might be useful in future. The survey provided rich data on confirmation sources, supporting its importance.

The confirmation source will be retained in the model until further testing shows that the recommendations of the focus group were correct in this instance. Figure 6.6 shows how the confirmation source fits into the revised version of the model.

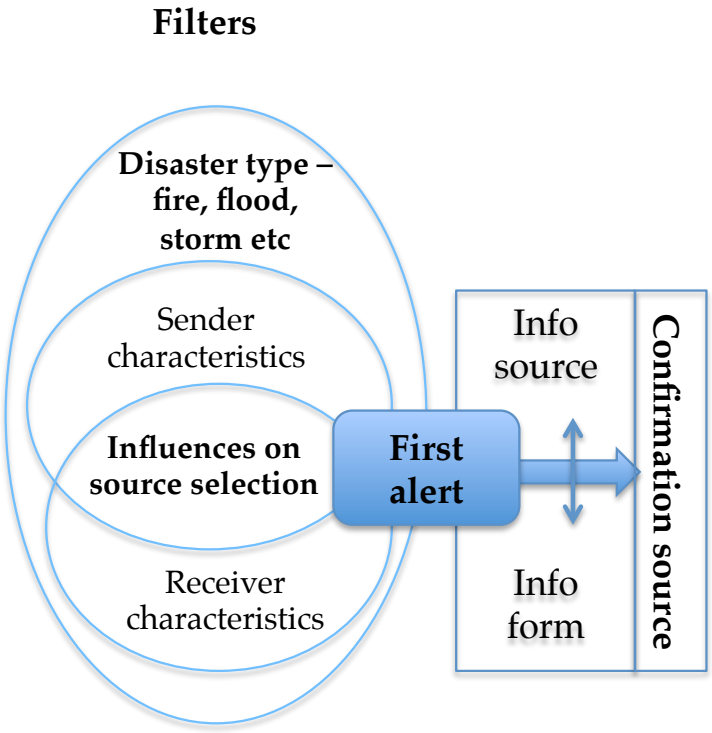



**Figure 6.6** **Confirmation source added the model, with source and form clearly separated**

The focus group triggered some debate about the importance of knowing what the confirmation source was in the information seeking process. The group dismissed knowledge of the confirmation source as unimportant, challenging Mileti and colleagues' model that included the validation of the first alert (Mileti 1995; Mileti & Fitzpatrick 1992; Mileti & O'Brien 1992), and the large number of studies that considered confirmation source important (Greenberg, Hofschire & Lachlan 2002; McIvor & Paton 2007; Phillips, Metz & Nieves 2005; Sharma, Patwardhan & Parthasarathy 2009). The strong support for the confirmation stage in the literature, and its place in the Mileti model resulted in retention of this aspect in the latest iteration of the disaster information seeking model.

### *6.2.5. Information source horizons*

The importance of different sources and channels of information was addressed in the disaster information seeking model in the source horizons, where three levels of importance were outlined: most important, of secondary importance and of marginal importance. This was considered to be a useful component of the model by the focus group participants and almost perfunctorily ticked off as a requirement that would help them determine the best way to deliver messages. "I would be happy if they were clumped together in three groups, of greatest impact" (FG3). The group agreed that this was necessary information for agencies, both to target the correct channels and using the right sources, and to review the effect of agency communication. This was supported by research reported in the literature, which collected information on importance of sources (Greenberg, Hofschire & Lachlan 2002; Legates & Biddle 1999; Perez-Lugo 2004; Piotrowski & Armstrong 1998; Procopio & Procopio 2007; Seeger et al. 2002). The data collected from the interviews and survey on source importance showed that this expectation by the group of this section of the model was justified given the type of data collected using this section of the model as a base. This component of the model will be retained as it appears in previous versions.

### *6.2.6. Source sequences*

The source sequences component of the model generated a "thinking out loud" discussion, starting with acceptance by one respondent that the sequence of sources would be useful to know, but ending with dismissal of the component as useful to an agency by the emergency communicators in the group. "For me as an emergency manager, it's interesting, but I want to know that they are getting the message, I don't really care the order in which they get it particularly (FG4)."

Removing source sequences also led to removal of the confirmation source, which the interviews and survey showed was significant component of information seeking behaviour – discussion on the retention of this element was recounted earlier in this section. This was also a short discussion – sealed with FG4's comment, from which they moved onto horizons and then what people wanted to know.

As a result of the discussion, respondents recommended that the source sequences should be replaced by investigation of what people look for in the information seeking process. Taking source sequences out of the model would be a practical step, given the problems encountered in Chapter 5 in drawing out a sequential process in data analysis beyond three steps. Even in the literature review, no disaster studies attempted to plot source sequences of individuals. Instead, insertion of the 'what people look for' component suggested by the focus group would improve the flow of the development of the model, because this concept was explored in the literature review, interviews and survey, but not factored into the model. The structure of the survey question addressing this aspect of information seeking behaviour was condensed because of the huge number of possible responses, but in the process the data collected lost its meaning. However, the concept could be formally inserted into the model and be further investigated for its impact on personalisation of the disaster.

With the source sequences replaced by information needs, and the confirmation source inserted, the resulting model might look like the diagram presented in Figure 6.7.

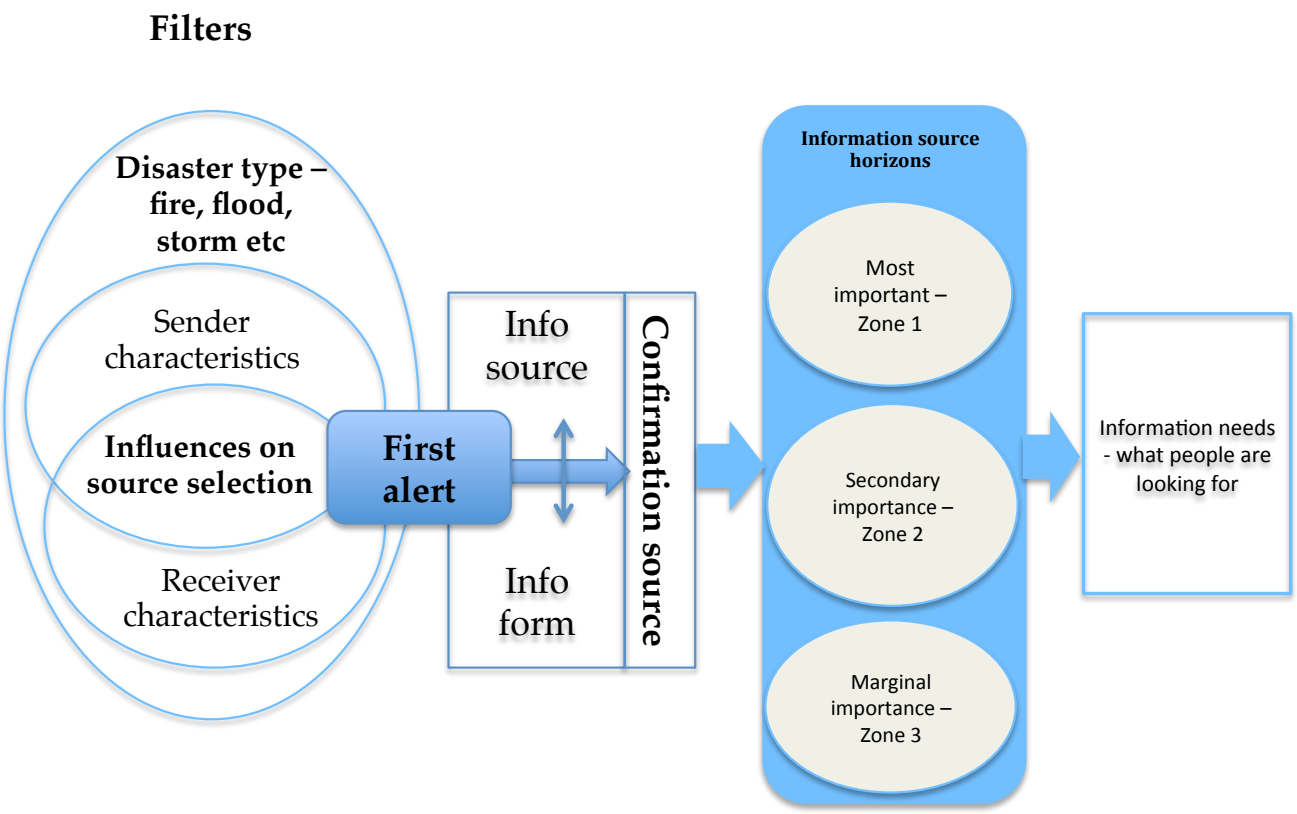



**Figure 6.7 Adding to the model the information source horizons, and replacing source sequences with 'what people want to know'.**

### *6.2.7. The personalisation triggers*

During the discussion about source sequences, the group moved on to what people in a disaster wanted to know, and specifically, what might be the trigger for action. This is what Mileti and O'Brien called personalisation of the disaster (Mileti & O'Brien 1992), at which point the individual takes action. Personalisation of the disaster was not addressed in the first iteration of the disaster information seeking model or the subsequent interviews or survey because the aim of this model was to provide a map describing what people do rather than why they do it. In addition, a trigger for action and action itself was not featured in Savolainen's ELIS model (Savolainen 2008b), on which the disaster information seeking model was based. In a warning context, Mileti and Fitzpatrick (1992) proposed that each individual underwent a process that started with hearing about the disaster. From here the individual would confirm – understand – believe and then personalise – decide – respond. The personalisation process (understanding, believing and then personalising the risk) was termed 'public risk perception' in their model. The focus group participants talked in depth about this process, using the word 'trigger' to denote the point at which a person will decide that either action is necessary or not necessary. The group was particularly interested in

this trigger, as identifying it would help emergency managers to develop messaging and target the right channels and sources if patterns could be identified for triggers for action, which is currently outside their understanding and influence.

The trigger discussion was sustained for some time and all of the respondents contributed. FG1 commented:

> *For me that trigger for action is the interesting bit, because I don't know whether there are patterns to that, but wouldn't it be great if we could quantify, look, 80% of people need three things in order to be convinced to take action, and 20% will take action on one thing, and 10% will never take any action no matter what happens…The big trigger is when shit is going bad, to actually accept that…that's the sort of threshold that you have to get people to step over…*

One suggestion was that the model might investigate what makes people personalise information, not so much what they need to know, but what information might trigger personalisation. FG1 suggested that the key question might be "What can I (the individual) do?"

> *The answer to that question will then trigger off a whole lot of actions or non-actions. 'What can I do? Nothing, so therefore I won't do anything.' 'What can I do? Well, I'm not going to sit here and drown in a flood or burn in a fire, so I'm going to start doing stuff'.*

FG1 explained that this lack of knowledge of the 'trigger' put motivating people to take action outside the influence of agencies:

> *… you can't influence that necessarily though; people's realisation, their personal 'light bulb' moment where they think, "Goodness, something terrible is happening" is not really within the control of the agencies…you can try and highlight their willingness to connect with it, but you can't really make that happen…*

FG3 elaborated: "…you know, in the fire context, the biggest problem we are dealing with is the 'wait and see'. This is all going on before someone actually says, 'Now I need to do something'." During the focus group, the trigger problem was discussed at four different times and mentioned within the context of other aspects of the model three more times. It was considered to be valuable because "…you understand what has to happen in order for the person to be prepared to do something…" (FG1). This

personalisation process in Mileti and Fitzpatrick's model was influenced by situational factors and disaster type combined with the type of information individuals look for. It is this type of information, 'what people want to know' that the group believed would combine with situational factors to trigger action, which could be protective action, or seeking further information. FG5 commented that the model should investigate what makes an individual personalise a situation.

The group agreed that while the model should not analyse decision-making, it did need to acknowledge that information seeking behaviour could facilitate decision-making. The suggestion of a trigger point represented for the focus group participants the point at which a person would take some type of action. This action could be physical action prompted by a major personalisation trigger, such as a bushfire taking hold close to the individual's house, or further information seeking prompted by a minor personalisation trigger, such as notification that a cyclone was forming 1000kms away.

Arising from the 'action' discussion was the fact that the model did not allow for inaction or a point of exit from the information seeking pathway. It was suggested that a mechanism enabling exit from the pathway be included.

These two points, the inclusion of a personalization trigger, and addition of an exit point, were considered and are presented in the model in Figure 6.8.

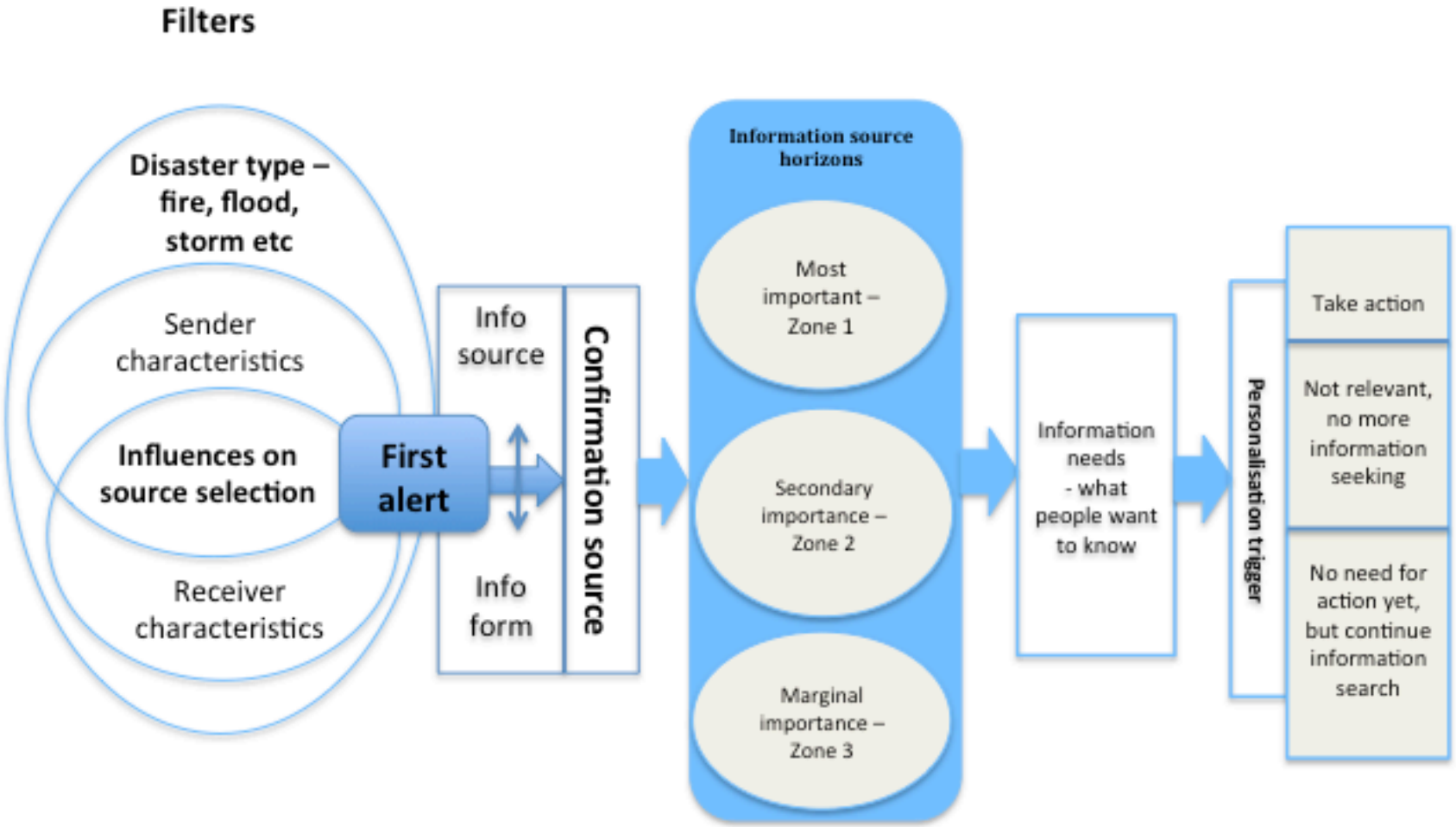



**Figure 6.8** **The effect on the model of removing the 'sequence of sources' component and replacing it with a mechanism for investigating what people look for and how this affects their information seeking pathway.**

### *6.2.8. The sensemaking loop*

The model contained a sensemaking loop that allowed the information seeker to collect information from a source or collection of sources and then renew their information seeking efforts based on the information they were able to find. This would account for people revisiting sources that had been previously consulted. This repeat use of sources was demonstrated in the interviews in which respondents recounted how new information would cause them to return to a previously consulted source with a slightly different information need, or to get an update on a consistent information need (such as path of a cyclone, the effect of flood heights based on a newly predicted flood level). It was also reflected in the survey, where respondents identified multiple information sources as very or most important. It was possible for a respondent to use as few as one or as many as eleven 'most important' sources, indicating some complexity in the information seeking process that included returning to certain sources multiple times during a disaster.

The focus group participants acknowledged the importance of the sensemaking process, with one participant explaining the sensemaking process that she went through when her own community experienced a bushfire:

> *At that point the information starts to narrow, the power goes out, the phone goes down, so you're getting smaller, so then you are much more reliant on that visual and environmental triggers and cues, so it's a funneling effect, you go from all of these possibilities, you can ring all of these people and check all of these websites, and then as the thing gets closer and closer, your options narrow. Then you hear the fire coming and you think "well, it's not in Kilmore anymore now, clearly, even when the website said it was, it's actually at the bottom of the paddock, you have to reframe your picture you have to update it with what you assume to be new information, and the thing that I was amazed about were the phone calls, we were just on the phone, up until the phones went down, ringing mum, ringing my sister, ringing my brother out of the area, ringing neighbours and people ringing us, and it's that frantic sensemaking, people are all desperately trying to create their own pictures (FG1).*

Her experience clearly demonstrated to the group the pathway from sensemaking to action:

> *I think also that one of the issues that I am seeing here is that I think there is an assumption that this is all someone is doing is seeking out information, but we actually know that people start going through a process, and it might be going*

*out into the paddock to fix up the pump or something and, sure, you are getting those visual cues and everything, but particularly, when it's really hitting the fan, people aren't multitasking, people are generally just doing one thing at a time, so if the job at mind is 'start the pump', that's all that matters at that point (FG3).*

The comments from the other participants following her story indicated that they understood that sensemaking loop in the model could both prompt and be prompted by a personalisation trigger and then lead to action.

*FG1: …I think you shut down, and it's a sense of unreality, I am getting ready for this thing to happen, which I never in my heart of hearts really believed was going to happen, but I am still unblocking the gutters, so you are going through this strange, altered…*

*FG2: Yeah, so going back to what you were saying about listening to the scanner at the servo, you got a piece of information, and you could have chosen x, y, or z, and you chose x…*

*FG1: Yes, because it was a hopeful outcome…*

*FG2: Well, it probably was, yes, so I think it was that lizard-brain thinking where you are not thinking it could be y or it could be z, oh my god, if it's z the fire is 3kms away…You go to what you have practiced, what you are ready to do…*

*FG3: It might be find where the kids are…and that may take 30 minutes…*

The personalisation trigger could prompt three different activities, depending on its level: more information seeking; no information seeking or action; or protective action followed by more information seeking. The interviews showed, particularly in a bushfire and cyclone, that while people were taking protective action, they were not looking for more information. This, along with the decision not to look for more information, represented two points at which people could exit the information seeking process during a disaster. The third option was to stay on the information behavior pathway by returning to the information seeking process. It was the potential of the model to help agencies to discover the trigger for protective action that particularly interested the group.

*FG3: …Something that is actually missing from this for me, and probably the most important part from an agency perspective, is actually the response, the response of what the person actually does with this information. So if we are telling people to leave, "Consider leaving, bad weather is on its way in three days or there is a flood coming," the actual physical response from people, you know in the fire context, the biggest problem that we are dealing*

*with is the 'wait and see'. This is all going on before somebody actually says, "now I need to do something". So I am wondering what the…*

*FG1: Well, this is the process, this is what they are doing while they are waiting and seeing, they are moving through this system multiple times, checking and verifying and discarding or adopting information as they go, or else they are watching the cricket.*

*FG2: I think what you are talking about is looking for evidence of action or inaction, that you'd like to plot into the model somehow.*

*Interviewer: So are you looking for a trigger point somehow? Or do you want to develop a deeper understanding?*

*FG3: Well, I think if you are developing a model, how all of those filters align so that whether it's the response that we are looking for, or whether it's an understanding of why someone gets to that point and therefore, you kind of reverse-engineer it, focus on this source because that is going to have the greater impact in terms of the response that we are looking for.*

Two key ideas emerged from the sensemaking section of the discussion to be included in the model – the personalisation trigger, which is the specific message that prompts the information seeker to make one of three choices (look for more information, drop out of the information seeking process, or take protective action) and the trigger for those who decide that it is time to take protective action. Both ideas are supported by the work of Mileti, Sorensen, O'Brien and Fitzpatrick (1992; 1992; 1990), but do see the model depart from the purely task-oriented information seeking format that the model occupied to this point. The effect of the personalisation trigger is shown in this version of the model in Figure 6.9, where the trigger could set in train a physical reaction, a new round of information seeking or departure from the information seeking process.

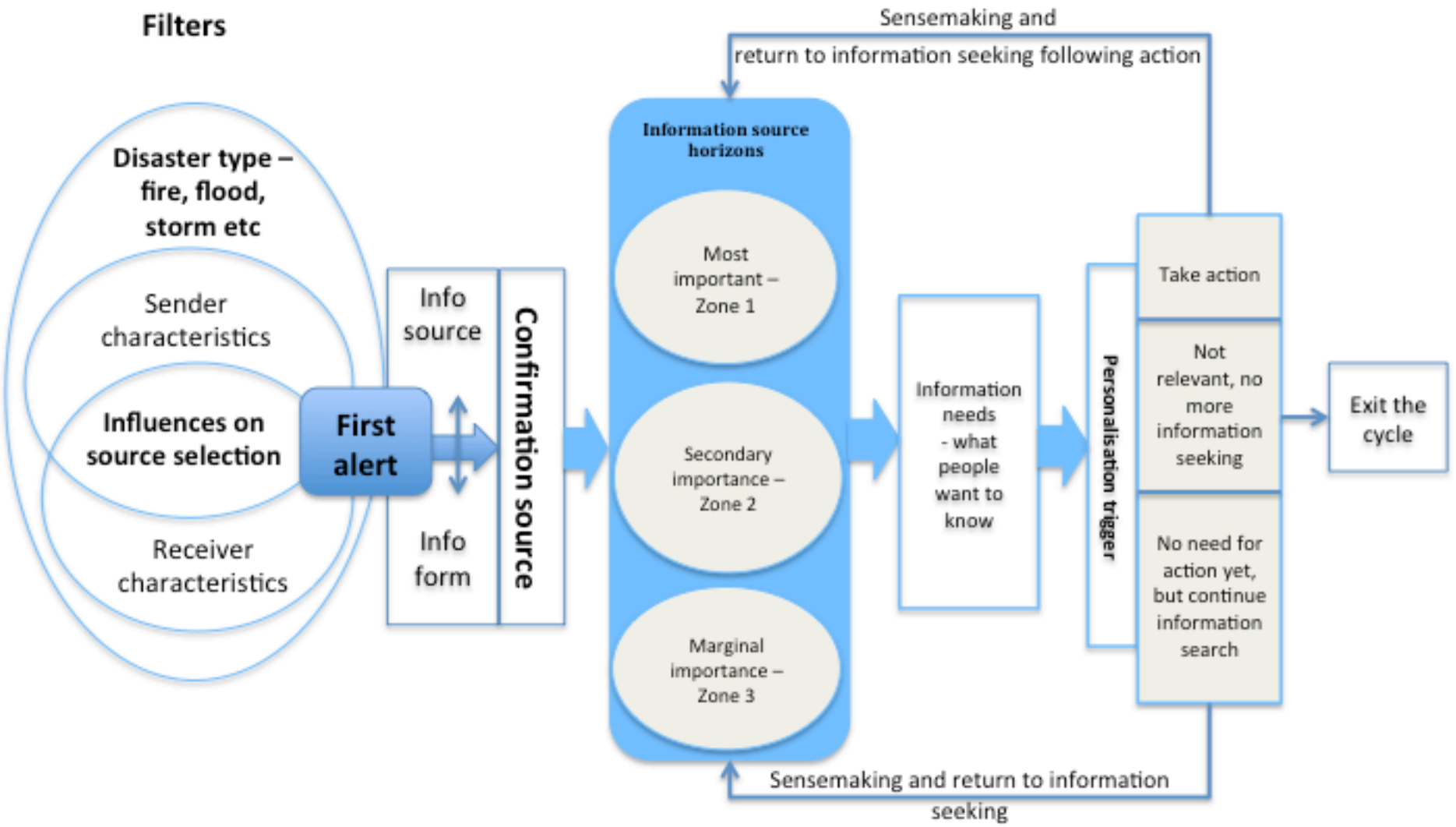



**Figure 6.9 The disaster information seeking model with modifications from interviews, a survey and focus group.**

## 6.3. Implications of the focus group for the model

After making the modifications suggested by the focus group, the disaster information seeking model has transformed from a version based very closely on Savolainen's problem-specific everyday life information seeking model (Savolainen 2008b) to a version that is much more closely aligned with the warning response model proposed by Mileti (1995), Mileti and O'Brien (1992)and Mileti and Peek (2000). This model proposed the six steps of response to news of a disaster:

1. Receiving an alert;
2. Believing the alert is credible/confirming the threat;
3. Personalising the threat;
4. Determining whether protective action is needed;
5. Determining whether protective action is feasible; and
6. Deciding what action to take and taking action.

The most recent iteration of the disaster information seeking model in this study has emerged with many more similarities to the risk communication for natural hazards model than when the model development process started. Savolainen's (1995, 2008b) source preference criteria were found to be more useful if they were melded with the sender and receiver characteristics and applied to the entire information behaviour process rather than just source selection. In addition, the personalisation process emerged as an important practicality for disaster communicators.

The focus group discussion prompted the following changes to be made to the disaster information seeking model:

1. Tighter relationships emerged between disaster type, influences on information seeking and the first alert, indicating that a less linear representation of the model be achieved. Disaster type was considered to influence alert source, as was each situation factor of the sender and receiver characteristics.
2. Influences of these factors appeared in previous iterations as influences on source selection, but the focus group emphasized the influence on the whole information seeking process, which was supported by the literature.
3. Form and source should be differentiated in future research to get a true picture of the features of information seeking.

4. Confirmation source was retained in the model, based on the literature – in contracts, the focus group participants did not believe it important.
5. Source horizons, in particular the most important source was retained.
6. Source sequences were abandoned given the focus group participants conviction that they were not useful combined with difficulties in quantitative studies to analyse sequences beyond three steps.
7. Information needs were found to be important to the participants, and supported by the literature.
8. A personalization trigger was considered important by the focus group participants and correlated with the importance of such a trigger in the Mileti model.
9. Three courses of action during the information seeking process were clarified: a repeated cycle of information seeking; exit from the information seeking pathway; and taking action based on information received followed by a return to information seeking.

The focus group participants pointed to the need for research into the triggers for action, and the idea of triggers for action was supported by the risk communication for natural hazards model at stages 4, 5 and 6. By comparing the warning response sequence proposed by Mileti and colleagues (1995; 1992; 1990) (and revisited above) with the final disaster information seeking model developed in this study, validation of the final version of the model emerges. Figure 6.11 shows the warning response sequence laid over the disaster information seeking model:

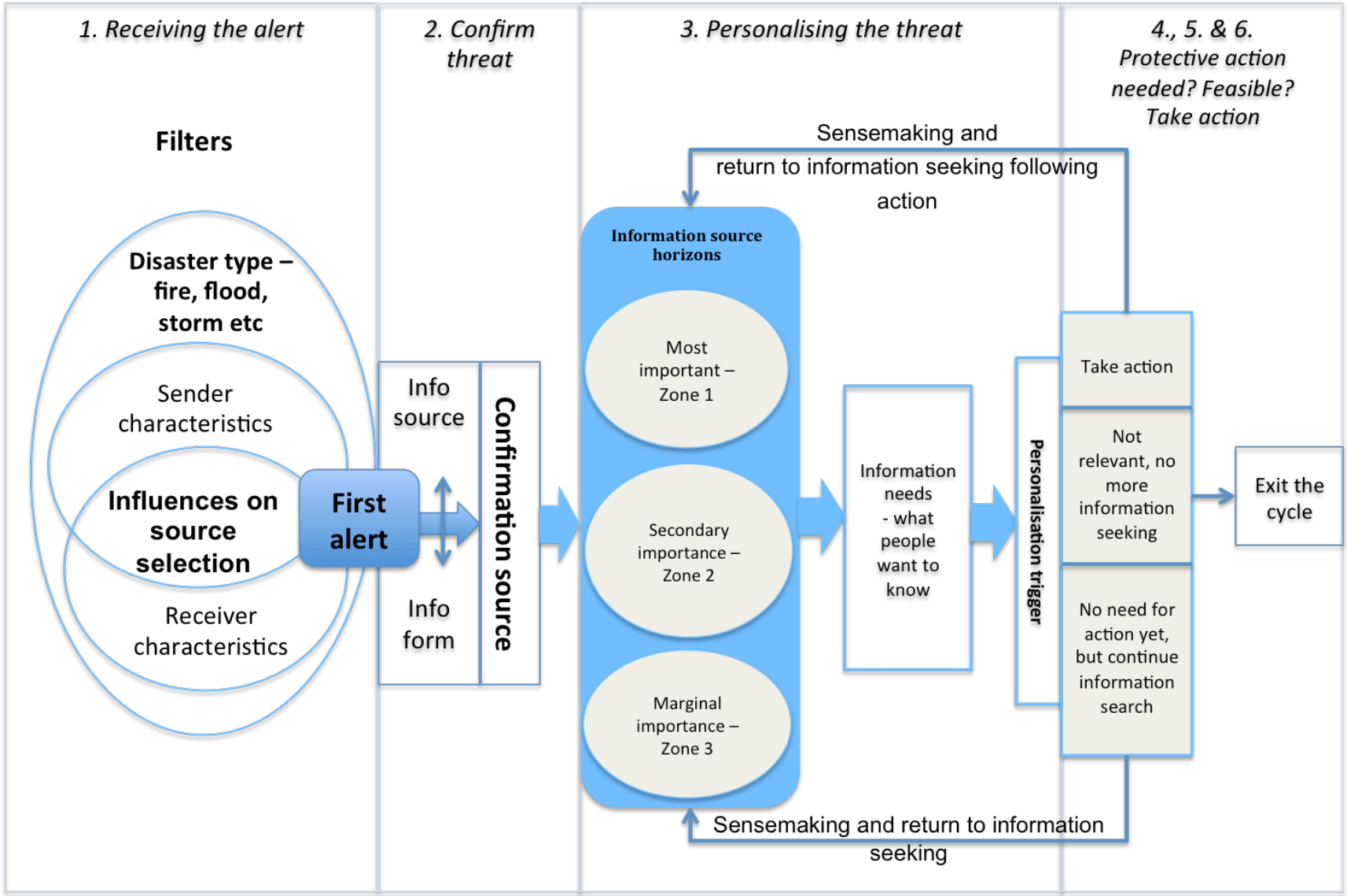



**Figure 6.10** **A comparison of the final version of the disaster information seeking model with Mileti et al.'s warning response process**

## 6.4. Summary of phase three: the focus group

The focus group participants confirmed that a number of elements of the disaster information seeking model would be useful and workable in a practical setting. However, they suggested a number of changes, ranging from minor to major, which would allow the model become more relevant to practice and more likely to be used for research that would inform communication practice in a disaster. Making the model more obviously describe a cyclical process was one of these changes. This reflected the experience of both practitioners and researchers that people look for information on a disaster continuously, returning to previously consulted sources with new information needs. Some of the language describing aspects of the model was also adapted from the focus group – for instance, the effect of situational factors on disaster alert type and information seeking generally was called 'filters' which was adopted for the model. The point at which a person realises the situation will affect them was described by the focus group members as the personalisation trigger, and as it aligned so well with Mileti and colleagues' model (1992; 1992; 1990), it was adopted for the model. An action component was not previously included, but the focus group suggested that it was an important step in the disaster information seeking process. As it was also an important element in the risk communication for natural hazards model (Mileti & Fitzpatrick 1992; Mileti & O'Brien 1992; Mileti & Sorensen 1990), it was included in the revised version. The framework became more reflective of the risk communication for natural hazards model than the problem-specific everyday life information seeking model (Savolainen 2008b).

The changes made the model more easily testable: by taking out the source sequence and leaving just a two step process – first alert and then confirmation source – the model could be later tested using a survey. Chapter 5 showed that there was no method of data analysis to draw out the order of information sources and that qualitative methods would be the only way to determine source sequence patterns. This problem with the original model was possibly one of the reasons all of Savolainen's research was qualitative (Kari & Savolainen 2007; Savolainen 1995, 2008a, 2010).

This chapter described the results of the focus group and its impact on development of the disaster information seeking model – the final version of the model is drawn in Figure 6.9. The next chapter will draw together the findings from each phase and discuss the results of the research.

# 7. Discussion

This chapter will present a summary and discussion of the research results, as well as a review of the development process of the resulting model. It will also show how, in responding to the research questions, a model for disaster information seeking was built, and in doing so, clarify the implications for model development in this field. The findings of the research, first reported in Chapters 4, 5 and 6, will be reviewed and explained in the context of this project and prior research.

Firstly, the results of the study will be summarised against the research questions before the meaning of the results are explained

## 7.1. A review of the results

This research aimed to find out whether a model might be used to explain disaster information seeking and if so, what forms disaster information seeking might take. It was also intended to establish a framework that was a practical addition to the field of emergency communication. This section will review the research questions and the results of this study reported in Chapters 4 to 6 before explaining the meaning of these results.

The research questions were:

*How do people look for information during the impact phase of an emergency?*

- *a) Can information models, which are well-established theory, be used to describe how people look for information during the impact phase of a disaster?*
- *b) What information seeking patterns emerge from the impact phase of a disaster?*
- *c) Can this knowledge extend known information theory and guide emergency agencies, as strategy and practice?*

The literature review revealed two possible models that could be used to determine how people look for information in a disaster, one from disaster research and the other from the information seeking field. The risk information for natural hazards model, developed by Mileti, Sorensen, O'Brien and Fitzpatrick (1995; 1992; 1992; 1990), attempted to describe factors affecting communication to people facing a disaster and the factors that might affect this communication. This model was built on a framework of human behaviour in a disaster, which was: receiving an alert, then believing the alert is credible or confirming the threat, then personalising the threat, determining whether protective action is needed and whether it is feasible, and then deciding what action to take. The Mileti group model focused on the

thought processes behind disaster behaviour and looked at influences on these thought processes. These influencing factors could relate to the way the message was presented (sender characteristics) and the background and circumstances of the person receiving the message (receiver characteristics). The model did not allow a detailed examination of the information seeking process; that is, what sources were used and when they were used. Figure 7.1 shows the risk communication in natural hazards model.

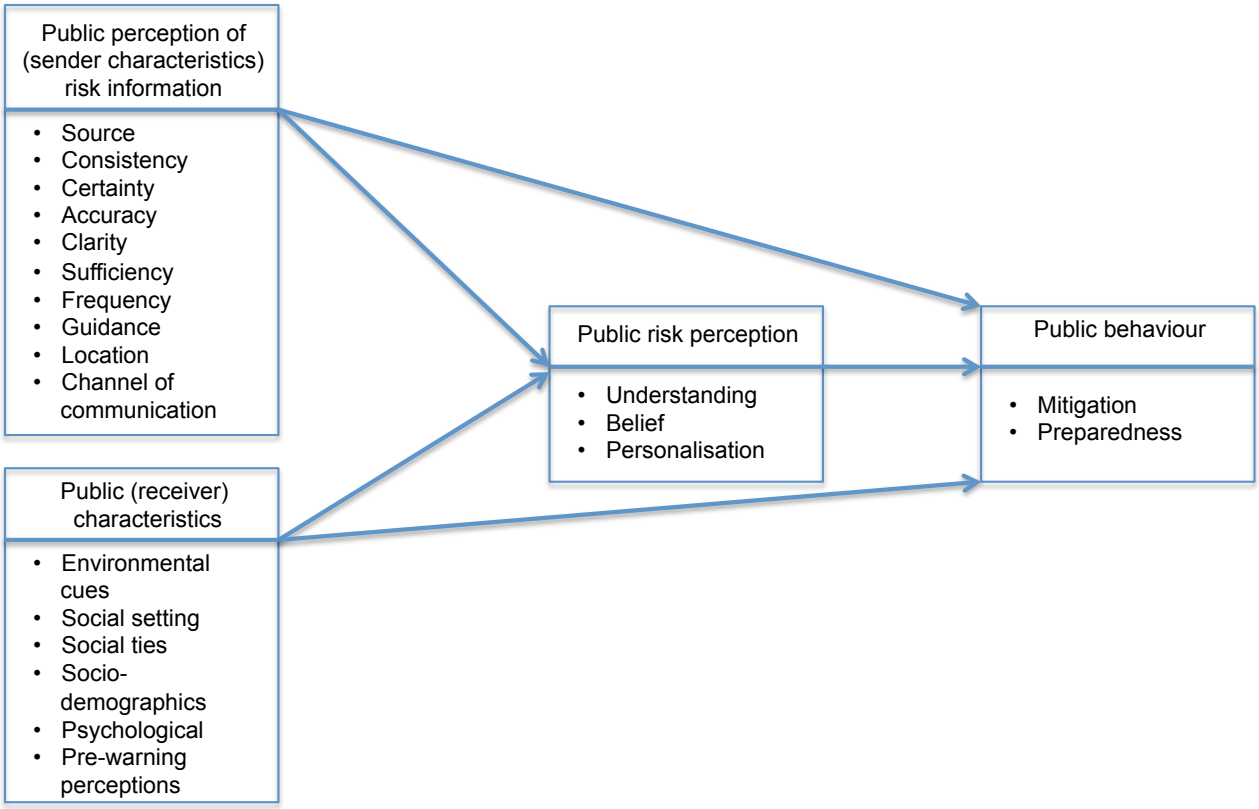



**Figure 7.1 The risk communication for natural hazards model (Mileti & Fitzpatrick 1992)**

The second model considered in this study did examine methods and sources of information seeking, although in an every day life information seeking context. It was drawn from an extensive body of literature in information seeking that also considered information behaviour from a range of perspectives including sensemaking, uncertainty reduction, and the task-oriented analysis of the process of seeking answers. Savolainen's information seeking model(1995) suited this study because of its task-oriented approach, but its ability to accommodate sensemaking behaviour, even if this behaviour was not analysed. His model described the methods and resources used by people making every day decisions, such as considering an issue close to them or buying a house. He later suggested this model could be applied to problem-specific situations (Savolainen 2008a, 2010), which gave this model

appeal in a disaster context. Figure 7.2 describes shows the project-specific every day life information seeking model.

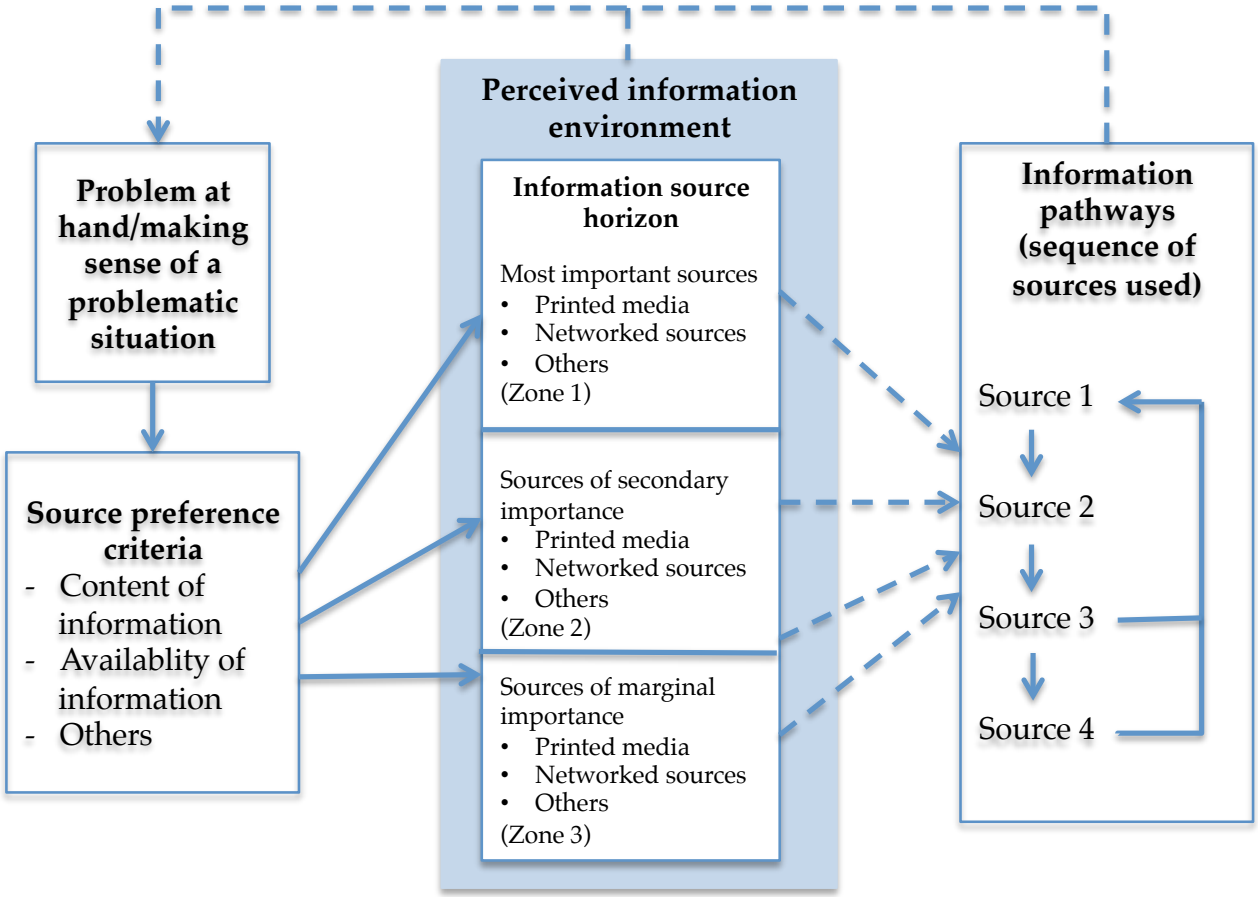



**Figure 7.2 Savolainen's problem-specific everyday life information seeking model (2008a)**

Disaster behaviour literature was reviewed for conclusions on information seeking in a disaster. Much of this research came from the United States, but studies were included from Australia, the United Kingdom, the Netherlands, New Zealand, Philippines, India, Bangladesh, Japan, China, Taiwan and Hong Kong. The literature on disaster behaviour and disaster information seeking was reviewed through the lens of the two information behaviour frameworks. Firstly, the risk communication for natural hazards provided an initial framework for the literature review using the sender and receiver characteristics, and gave clues on the sequence of disaster behaviour. The first alert, confirmation source and main source were found to differ across disaster types and communities – for example, in tornadoes, many studies found that people heard about the tornado from other people or television and confirmed the news by checking with other people (Chaney & Weaver 2008;

Legates & Biddle 1999; National Weather Service Central Region 2011). This was the case for many high impact or more urgent disasters including terrorist or shooter attack (Greenberg, Hofschire & Lachlan 2002; Jones & Rainie 2002; Palen et al. 2009; Seeger 2002) and storm (Drobot, Schmidt & Demuth 2008). In slower disasters, such as hurricanes, people tended to learn about the disaster from media (Jones & Rainie 2002; Perez-Lugo 2004; Perry 2007; Taylor, K. et al. 2009). Receiver characteristics such as source and form of the message, features of the wording of the message, accessibility and availability of the media were all found to affect comprehension of and reaction to situation (Austin, Fisher Liu & Jin 2012; Breakwell 2000; Fischer III et al. 1995; Heath & Palenchar 2000; Utz, Schultz & Glocka 2013). Sender characteristics were found to affect behaviour, such as the situation people found themselves in and the surrounding environment (Chaney & Weaver 2008; Cutter & Barnes 1982; Donner, Rodriguez & Diaz 2007; Legates & Biddle 1999; National Weather Service Central Region 2011; Thomson et al. 2012), social setting and social ties (Fischer III et al. 1995; Hurlbert, Haines & Beggs 2000; Kim & Kang 2010; Mileti 1995), age (Lachlan, Spence & Nelson 2008; Piotrowski & Armstrong 1998; Sorensen 1991), gender (Bateman & Edwards 2002; Fothergill 1996; Lachlan, Spence & Nelson 2008; Meyer 2010), race or ethnicity (Burke, Spence & Lachlan 2010; Hayden et al. 2007; Legates & Biddle 1999; Perry & Green 1982), resources (Eisenman et al. 2007; Elliott & Pais 2006; Kuppuswamy 2014; Lindell, Prater & Peacock 2005; Morrow 1999), and psychological characteristics such as cognitive processes (Eisenman et al. 2007; Paul & Stimers 2011; Sherman-Morris 2005; Taylor, K. et al. 2009) and locus of control (Karanci, Aksit & Dirik 2005; Perry & Green 1982; Scott et al. 2010).

Secondly, the problem-specific every day life information seeking model lent information seeking legitimacy to the literature analysis framework adopted from the Mileti et al. model and provided the structure to plot step-by-step sequence of disaster information seeking. In adapting these two models for application to disaster information seeking, the first alert was considered an unsought trigger for subsequent information seeking behaviour, and rather than include it within the sensemaking loop as Savolainen had done, it was placed outside the information seeking process to reflect an independent position as a trigger for the process. In addition, sender and receiver characteristics from Mileti et al.'s model became part of the source preference criteria (and later, the influences on source selection), expanding on Savolainen's source preference criteria to make them more comprehensive. The second step of Mileti's disaster behaviour sequence was incorporated into the source sequences with the second source becoming the confirmation source. The resulting model of disaster information seeking from the literature review is shown in Figure 7.3.

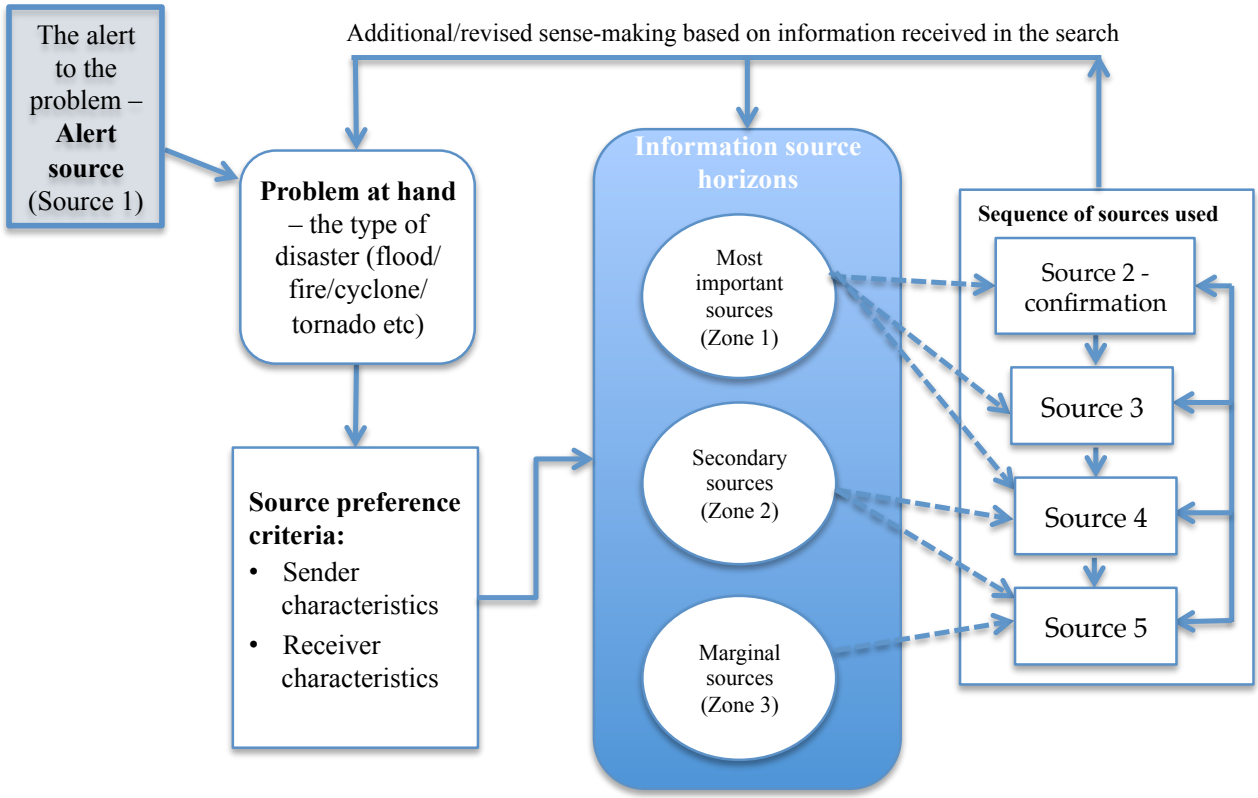



**Figure 7.3 A model of disaster information seeking**

This model was then used as a framework for three phases of research: 51 semi-structured interviews in four disaster-affected communities, an online and mail survey that attracted 340 useable responses, and focus group of six emergency communication practitioners and researchers. At the end of each phase of research, changes were made to the model to reflect the findings of the research. The interviews showed that time was an important component during the information seeking process, and that the disaster type played a larger role in its effect on the model than Savolainen's original 'problem at hand'. The sensemaking loop was shown in the interviews to be an important component of the information seeking process and the confirmation source was shown to be a legitimate inclusion. The interviews also showed that the model provided a comfortable framework for explaining how people look for information in a disaster, but it did not accommodate what people look for. The coding process also showed time to be an influencing factor of the type and rate of information seeking during each disaster, and this was factored in to a new version of the model. In addition, use of the term 'source preference criteria' that Savolainen (2008b) used to describe the situational factors affected information seeking model was shown to sit uncomfortably with the reality. Source preference criteria implied a conscious selection of information

sources and forms that was not evident from the interviews. Also, while media availability might be a legitimate factor in conscious selection of sources, a situational factor such as age or culture was not. The analysis of the interviews source preference criteria produced a term that better reflected the role of situational factors, which in most cases seemed to be a completely unconscious decision: influences on source selection. This term replaced source preference criteria in the model, and retained the classification of these influences into sender characteristics and receiver characteristics. The disaster information seeking model after changes prompted by the interviews is presented in Figure 7.4.

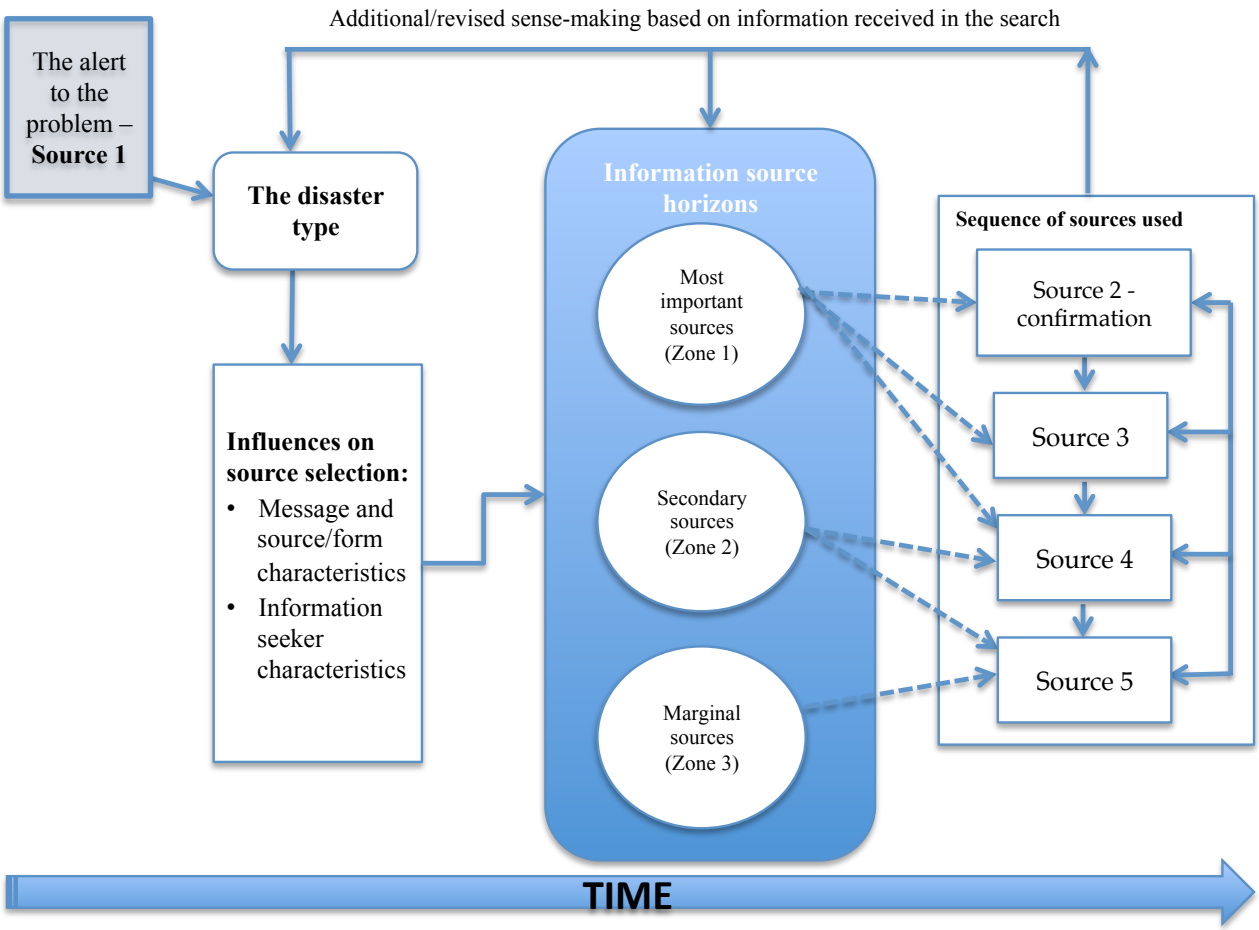



**Figure 7.4 The disaster information seeking model after the interview phase of the study**

In addition, the interviews showed that patterns of information seeking behaviour could be plotted against the disaster information seeking model for certain communities experiencing certain types of disaster. Table 7.1 over the page summarises the results for the four communities studied in the interviews

**Table 7.1 Summary of information seeking behaviour from the interviews**

| Community and disaster type | Alerts | Confirmation sources | Most important sources | What people wanted to know | Sender and receiver characteristics affecting source selection |
|---|---|---|---|---|---|
| **Slow flood St George** | Environmental cues<br>ABC radio<br>Other people directly<br>Agency contacts<br>BOM website<br>Television<br>Commercial radio | Other people directly<br>Environmental cues<br>Agency contacts | Other people directly<br>ABC radio<br>BOM website<br>Agency contacts | Effect on them<br>Peak information<br>Experience of others<br>How others had fared<br>What agencies were doing<br>Evacuation information<br>How workplace fared<br>Rumour testing<br>Road closures<br>Restoration of power | Availability of/access to media<br>Consistency of messages<br>Accuracy of messages<br>Certainty of messages<br>Guidance contained in messages<br>Frequency of messages<br>Environment<br>Social ties/community networks<br>Proximity to river<br>Resources<br>Cognitive abilities<br>Experience<br>Locus of control |
| **Flash flood Toowoomba** | Other people directly<br>Environmental cues<br>ABC radio | Other people directly<br>Television<br>News/weather website<br>BOM website<br>Environmental cues | Television<br>ABC radio<br>Other people directly<br>Agency website<br>News/weather website<br>Agency social media | What happened<br>Welfare of family/friends<br>What to do<br>Weather forecasts<br>Where will the water go | Availability of/access to media<br>Availability of images<br>Cognitive abilities<br>Accuracy of messages<br>Clarity of messages<br>Consistency of messages<br>Frequency of messages/new information<br>Social ties/community networks<br>Environment incl. time of day |

| Community and disaster type | Alerts | Confirmation sources | Most important sources | What people wanted to know | Sender and receiver characteristics affecting source selection |
|---|---|---|---|---|---|
| **Bushfire Gerogery** | Other people directly<br>Environmental cues<br>ABC radio | Other people directly<br>Environmental cues<br>Commercial radio | Other people directly<br>Environmental cues<br>ABC radio | Where the fire is<br>Path/intensity of the fire<br>Will it affect me<br>Welfare of family/friends<br>What to do<br>Where to evacuate to<br>Road closures | Proximity to fire/location in relation to fire<br>Availability of/access to media<br>Experience<br>Cognitive abilities<br>Social ties/community networks<br>Locus of control<br>Gender<br>Experience<br>Resources<br>Environment including time |
| **Cyclone Airlie Beach** | BOM website<br>Commercial radio<br>Television<br>ABC radio<br>Other people indirectly | BOM website<br>Other weather websites<br>Other people directly | Commercial radio<br>Other people directly<br>BOM website<br>ABC radio<br>Other websites<br>Television | Track and intensity<br>Damage<br>How others fared<br>Where to get supplies<br>Checking friends/family<br>Restoration of power<br>When airport would reopen | Social ties/community networks<br>Proximity to landfall area<br>Resources<br>Experience<br>Cognitive abilities<br>Locus of control<br>Availability of/access to media<br>Certainty of messages |

Phase two of the study was an online and mail survey that attracted 340 useable responses. The survey confirmed that the disaster type influenced the form and source of the alert, which indicated that this component belonged outside the information seeking loop as an influence over the entire process. The survey showed that the alert source, which was sitting outside the loop and therefore outside the influence of other factors, should be more tightly integrated into the process and the effect of disaster type on this first source of information accounted for in the model. After the survey, the model appeared as it does in Figure 7.5, below, with just one change made to the location of disaster type and first alert.

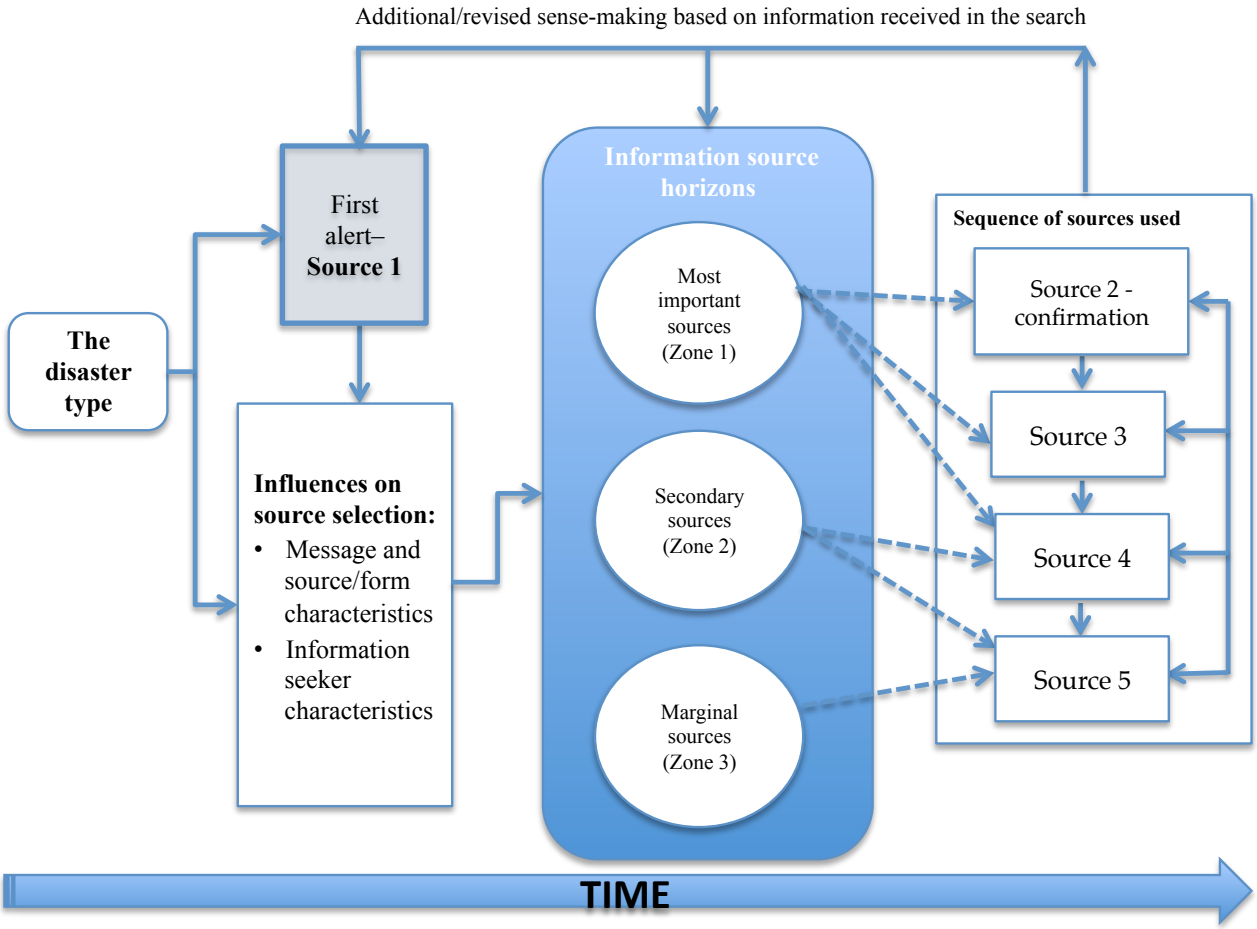



**Figure 7.5 The disaster information seeking model after the survey**

The survey also provided a much larger bank of information seeking pathways for each disaster type, and indicated that influences on source selection could be an important part of the information seeking process in a disaster. It also provided information on the influence of time and social ties on information seeking. Information seeking behaviour uncovered by the survey are summarised in Table 7.2.

## Table 7.2 Summary of information seeking behavior revealed by the survey

| Disaster type | Alert source | Confirmation source | Most important sources | Time taken to look | Contact with other people |
|---|---|---|---|---|---|
| **Slow flood** | Television<br>Radio<br>Other people directly<br>Agency contacts | News/weather website<br>Television<br>Agency website | News/weather websites<br>Radio<br>Television<br>Environmental cues<br>Agency phone/text messages | < 1hr – 89.7%<br>1-2hrs – 7.7%<br>No memory – 2.6% | Mobile phone – voice<br>Landline |
| **Flash flood** | Other people directly<br>Environmental cues<br>Television<br>Radio<br>Other people indirectly | News/weather website<br>Radio<br>Television<br>Other people directly | Television<br>Other people directly<br>News/weather websites<br>Radio | < 1 hr - 85.1%<br>1-2hrs – 10.6%<br>2-4hrs – 3.2%<br>1 day – 1.1% | Mobile phone – voice<br>Mobile phone – text<br>Landline |
| **Bushfire** | Environmental cues<br>Radio<br>Other people directly<br>Agency phone/text message<br>Agency personnel | Agency website<br>News/weather website<br>Other people directly<br>Television | Radio<br>Agency contacts<br>Environmental cues<br>Other people directly<br>News/weather websites | < 1hr – 100% | Landline<br>Mobile phone - voice |
| **Cyclone** | News/weather website<br>Television<br>Radio<br>Other people directly | News/weather website<br>Radio<br>Television<br>Agency website | News/weather websites<br>Radio<br>Television<br>Agency website | < 1 hr - 70.6%<br>1-2hrs – 11.8%<br>2-4hrs – 17.6% | Mobile phone – voice<br>Face-to-face<br>Mobile phone - text |
| **Storm** | Other people directly<br>Environmental cues<br>News/weather website<br>Agency contact | Environmental cues<br>Other people directly<br>Other people indirectly | Environmental cues<br>Other people directly<br>Television<br>Radio | <1 hr – 83.3%<br>2-4 hr – 16.7% | Face-to-face<br>Mobile phone - voice |
| **Earthquake** | Environmental cues | Other people directly<br>Radio<br>Agency contact | Other people directly<br>Other people indirectly<br>Environmental cues | < 1hr – 100% | Landline |
| **Tornado** | Television<br>News/weather website | Television<br>Other people directly<br>Environmental cues | Other people directly<br>Other people indirectly<br>Environmental cues<br>News/weather websites<br>Radio | < 1hr – 100% | Mobile phone - voice |
| **Tsunami** | Other people directly<br>News/weather website | Radio<br>Agency website | Other people directly<br>Other people indirectly<br>Environmental cues<br>Agency phone/text message | < 1hr – 100% | Face-to-face<br>Email |

| Disaster type | Alert source | Confirmation source | Most important sources | Time taken to look | Contact with other people |
|---|---|---|---|---|---|
| **Mudslide** | Other people directly | News/weather website | Other people directly<br>Environmental cues<br>Radio<br>News/weather website | < 1hr – 100% | Mobile phone - voice |

In addition, the survey provided legitimacy to the inclusion of influences on source selection in the model, showing that each of the influences tested by the survey could have at least some effect on how people seek information in a disaster. Strong indications emerged from the survey on the effect of gender, age, household size, and number of dependents, social ties and proximity. The effect of education and income on source selection was very small in this data set, but there were some differences that indicated that both should be retained as possible influences. This action was supported by other studies that found some relationship between education or income and disaster behaviour.

Following the survey analysis and development of a new version of the model with the disaster type influence on the first alert accounted for, the model was taken to a focus group of six disaster communication practitioners and researchers. The focus group attendees worked through each component of the model and discussed whether it was applicable and workable in a practical setting. A number of suggestions were made based on their experiences communicating with communities in a disaster or researching disaster communication. These suggestions were compared with the results of literature review, interviews and survey in order to determine whether they should be implemented or set aside. The key points from the focus group that were later applied to the model were:

- the nature of information seeking is circular and less linear than represented by the model;
- the influences on source selection were considered to have a wider effect on all aspects of information seeking than was represented in the model, not just the selection of sources;
- these influences were referred to as filters by the group;
- information needs was considered an important inclusion in a new version of the model, while source sequences were considered unimportant; and
- the personalisation trigger, which was a key step in Mileti's disaster behaviour process, and the action it prompted, was considered by the group to be a serious omission from the disaster information seeking model.

All of these points were used to adapt the model, although source 2 of the source sequences, the confirmation source, was retained because of the importance it was accorded in the literature review, the interviews and the survey. The resulting model is represented in Figure 7.6 below.

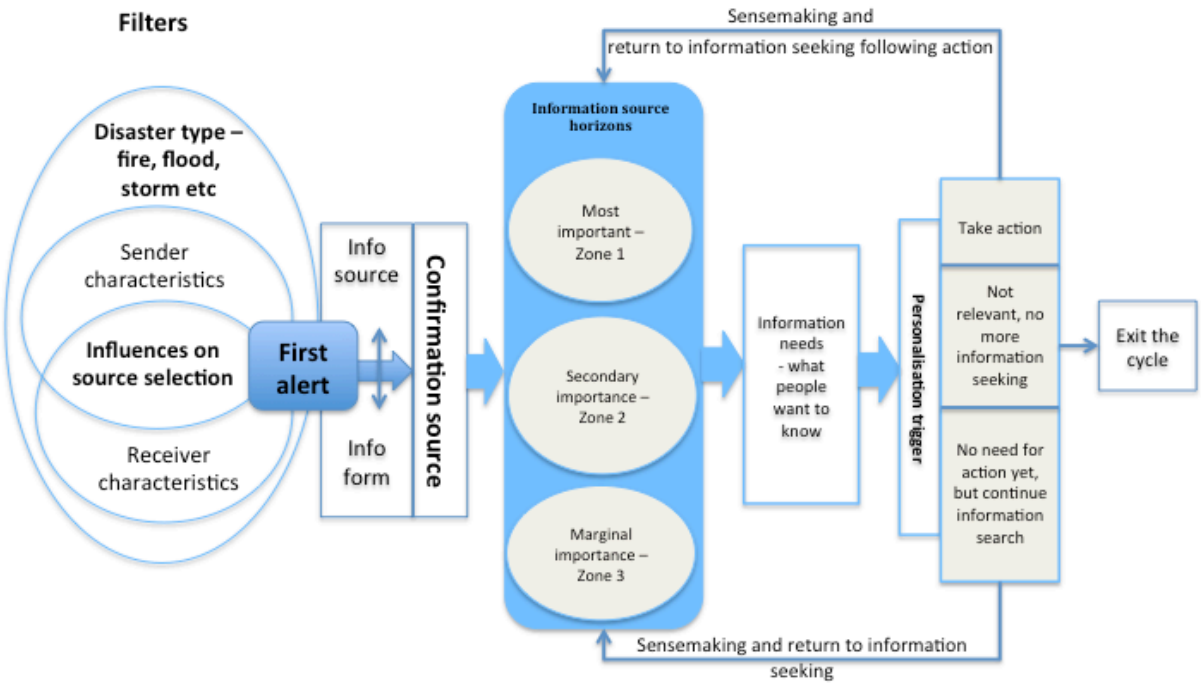



**Figure 7.6 The disaster information seeking model after the focus group**

The model accommodates the disaster behaviour process identified by Mileti, O'Brien and Fitzpatrick (Mileti 1995; Mileti & Fitzpatrick 1992; Mileti & O'Brien 1992):

1. Receive a warning or alert (the filters section on the model);
2. Confirm the threat and its credibility (the confirmation of source and sensemaking sections of the model);
3. Understand what is happening (information source horizons, information needs, and sensemaking sections);
4. Personalise the threat (information needs and sensemaking sections);
5. Determine whether protective action is needed (the personalisation trigger and sensemaking sections);
6. Determine whether protective action is possible (take action section); and
7. Decide what action to take and take action (take action section).

The next section will contain an explanation of the meaning of the results, and will discuss these results in the context of this project and previous research on information seeking in disaster.

## 7.2. The meaning of the results

The research question was 'How do people look for information during the impact phase of an emergency?'. This section will look at what the results mean and how they answer each of the sub-questions.

a) *Can information models, which are well-established theory, be used to describe how people look for information during the impact phase of a disaster?*

The main contribution to knowledge of this study was the development of a model for disaster information seeking in a field that was not served well by existing theoretical frameworks. This research found that two models, the risk information for natural hazards model created by Mileti, Sorensen, O'Brien and Fitzpatrick (1992; 1992; 1990), and the project-specific everday life information seeking model by Savolainen (2008a), provided a solid foundation for the development of a disaster information seeking model. However, neither model suited the task in a tailored way – the risk communication model did not support a step-by-step explanation of the information seeking process. The everyday life information seeking model did not quite support the unique circumstances of disaster and subsequent behaviour by individuals, which was presented very clearly by Mileti, Sorensen, O'Brien and Fitzpatrick (1992; 1992; 1990). The other difference between everyday life information seeking and disaster information seeking was the need for a clear confirmation stage in the information seeking process, which had been evident in research that used the risk communication for natural hazards model as a framework, but not in Savolainen's (2007b, 2010) research. While the disaster information seeking model developed in this study needs to be tested, the interviews, survey and focus group supported its suitability for describing disaster information seeking behaviour and its usefulness for communication planning in disaster. The study showed that information distilled from the interview and survey phases could be applied to the model to provide a disaster information seeking map for specific communities, examples of which are provided in Chapter 4 for the four disaster-affected communities studied in the interviews.

Use of the disaster information seeking model to develop information seeking maps of specific communities shows that this model, developed from models from disaster literature and the information seeking field, can be used to describe how people look for information during the impact phase of a disaster. It could also be used in conjunction with number of other models that attempted to explain disaster behaviour more holistically. These might include investigation into why people look for information using uncertainty reduction theory (Berger 1985), analysis of decision-making during a disaster with Lindell and Perry's protective action decision-making model (PADM)

(Lindell & Perry 2012), or how people make sense of what they are seeing and hearing (Dervin 1999; Weick 1988). The preoccupation of the focus group discussion on triggers for certain behaviours showed that exploring information seeking in more depth than simply a task-oriented analysis would be a useful exercise.

*b) What information seeking patterns emerge from the impact phase of a disaster?*

Information seeking patterns were identified across disaster types, and examples of these applied to disaster-specific and community-specific maps that could guide communication by agencies. The two research phases produced a range of rich data that laid out specific information seeking patterns. These patterns related to disaster type and were summarised in Tables 7.1 and 7.2. The data showed that people in a more intense disaster, what the focus group participants called a 'rapid onset disaster' such as bushfire or flash flood, drew from a smaller pool of information sources than the people who had experienced the 'slow onset disasters' such as cyclone and slow flood. Most important sources across disasters were very similar, with a group of about five sources appearing as the most important sources for most disasters, but in different orders for each. Being able to see the impact of the disaster was important for sensemaking across all of the disasters – environmental cues and sources that provided images were important across all the disasters researched. In cyclone for instance, the Bureau of Meteorology website and other websites with their maps of the track of the cyclone, plus television, featured highly in alert, confirmation and most important sources. The flood map image produced by the council in the St George slow flood was valued by a number of interview respondents. In the flash flood situation, the interviewees spoke about the importance of being able to see the results of the flood in pictures sent by friends, or footage on television, in order to make sense of what was happening, and this was reflected by the source pool for the flash flood survey respondents. Bushfire respondents in both the interviews and the survey relied on smoke to help them make sense of the path of the fire and what it meant for themselves and their family.

A key point of interest from the survey and interview data was the low use of social media by respondents. The interviews were conducted in 2010 and the survey in 2013, by which time social media was an accepted form of every day communication, yet the sources 'other people indirectly' (email and social media) and agency social media were hardly used. In the survey, 3.9% of respondents received their alert from an agency social media site and 4% used it as a confirmation source, while 16.7% of people listed it as their most important source (compared with 39.5% listing environmental cues and the same number listing radio as one of their most important sources). This finding

surprised the focus group participants, who had assumed that social media was a common tool.

A number of information seeking patterns were discovered using this study's disaster information seeking model as a framework. These patterns were specific to disaster types and certain communities represented by the respondents to the interviews and the survey, and provided a clear starting point for further research that could generalise information seeking patterns in a disaster.

c) *Can this knowledge extend known information theory and guide emergency agencies, as strategy and practice?*

This study showed that Savolainen's problem-specific information seeking model (2008b) could be applied to a disaster situation, albeit with several alterations to suit the unique circumstances of a disaster. These circumstances were mostly predicted by the work of Mileti, Sorensen, O'Brien and Fitzpatrick: the disaster-specific context of the first alert, the importance of the confirmation process and the source used in this process, the personalization process and the information required to facilitate this, and the trigger for action. The time-driven nature of disaster information seeking process also made it different from the contexts that Savolainen may have considered for the application of his original model.

The importance of this model to the disaster communication planning process is evident. The model allows communicators to understand disaster information seeking behaviour and the influences brought to bear on the information seeking process. Understanding these influences (such as access to forms of media, age, culture, experience, resources) and where they appear in a subject community, will allow communicators to develop plans that segment certain groups within a community and then to map the most effective communication tools and sources for each group. The focus group, which tested the usefulness and practicality of the disaster information seeking model, stressed the importance of agencies understanding the sender and receiver characteristics that influence disaster behaviour. The emphasis appeared with constant references by focus group participants to the situation that the individual finds himself in and his background dictating his subsequent actions. The focus group also revealed the importance for the disaster information seeking model to align closely with the Mileti, Sorensen, O'Brien and Fitzpatrick (1992; 1992; 1990) framework of disaster behaviour in order to make it a model applicable to practice.

The information seeking maps that were developed in Chapter 4 for specific communities experiencing specific disasters show how the earlier version of the model could have guided the communication function for a community. Each of the maps identified key influences on source selection and specific sources for alert, confirmation and ongoing information seeking. Future research could enable similar maps to be developed based on the most recent version of the model that also accounts for information needs and the personalisation triggers for different segments of the community. In Australia, local governments are the first level of disaster management, and already have much of the information needed to develop such maps, particularly relating to media availability and receiver demographic characteristics. The model on which the interview disaster information seeking maps were based was further improved using survey data, which saw respondents report their own information seeking experiences successfully against the improved model.

In addition, the final phase of the research, the focus groups, was aimed at ensuring the model had practical application the disaster communication field. Significant changes that were within the bounds of existing knowledge on disaster behaviour were made to the model to ensure this practicality. While this final model requires valid and rigorous testing with further research, each step leading up to this final version of the disaster information seeking model was based on a solid foundation of theory and subsequent research, providing confidence that the model will stand up to such research.

## 7.3. Relationship of this study to previous research

This section will address how this study relates to previous research in the disaster information seeking field.

The overarching research question was "How do people look for information during the impact phase of a disaster?" Research considered in the literature review in Chapter 2 was able to show how people behaved in a disaster, but was not able to show information seeking behaviour patterns beyond how they received a warning or alert and what their main source of information was, or how they used particular sources of information. Many of the studies looked at other issues of interest to researchers, such as triggers for evacuation or the experiences of the disabled, and asked questions about sources or messages as part of this broader issue. This prevented a complete picture of information seeking behaviour in a disaster from being presented, despite disaster behaviour being well explored and providing a good foundation for such a picture, and the field of information seeking containing several plausible models for this purpose.

The starting point for such a 'big picture' view was locating a theory or model to support information seeking behaviour in a disaster, and this was the topic of the first sub-question – "Can information models, which are well-established theory, be used to describe how people look for information in a disaster?". The literature review showed that Savolainen's blueprint for information seeking behaviour (2008a) in ordinary circumstances might be informed by disaster behaviour theory and that Mileti et al.'s (1992; 1992; 1990) risk communication model presents a plausible framework for disaster information seeking. This study's model's explanation of the process of looking for information in a disaster was supported by studies that incorporated or focus on communication tools, information sources and disaster messaging, and also the reasons that people look for information in this circumstance. The three phases of research attempted to determine the plausibility of the disaster information seeking model as a way of explaining the information seeking aspect of disaster behaviour.

These three phases of research also answered the second sub-question – "What information seeking patterns emerge from the impact phase of a disaster?". This was a question that could not be answered by a review of the literature, as studies presented only part of the information behaviour picture. Questions have been asked by other researchers, such as how people heard about a disaster, how long it took them to take action, what was their favoured source of information, why they preferred certain sources, how they used certain sources (often restricted to a group such as social media or mainstream media without presenting the whole range of possible sources), and what messages were effective. In the existing literature, these rarely appear in one study to present an holistic information seeking view, and never against an information seeking framework. Valuable information on the information seeking process was delivered piecemeal across disaster types, countries and over time, preventing a complete picture from being formed. This sub-question focused this study on incorporating all of these aspects of information seeking into one framework and using this framework for a more methodical approach. The interview and survey phases provided a clear picture of how the information seeking process might look – from the first alert, through the search for information, settlement of the information seeker on a suite of trusted and accessible sources, the sensemaking process, and the influences on the process from start to finish. In this, the study reflected the approach by researchers in the information seeking field, who had been investigating information seeking behaviour since the 1930s and had developed several explanations of the information seeking process for testing.

The final sub-question was "Can this knowledge extend information theory and guide emergency agencies in strategy and practice?". This question was not addressed in the literature review, as it related to original ideas developed from the literature review, the interviews and the survey. The ideas were then tested in the focus group and this question answered in the final phase of the study. In this phase, disaster communication practitioners and researchers were asked to review each component of the model against their experience of how people seek information in a disaster and what practitioners want to know about this behaviour. The version of the disaster information seeking model that emerged from this focus group was rooted very strongly in the requirements of practitioners – such as the inclusion of expansion of role of influences on information seeking, inclusion of a formal mechanism for determining what people look for, and incorporation of the personalisation trigger, the point at which people decide this disaster is going to affect them in some way. Each of these mechanisms was also firmly embedded in disaster behaviour theory, in particular, the six step process put forward by Mileti and O'Brien (1992) and the risk communication for natural hazards model developed by Mileti and O'Brien (1992) along with Fitzpatrick (1992).

Overall, this study builds on previous research in two ways. It provides a model for disaster information seeking in field where only one model had previously been considered, albeit not extensively discussed or used by researchers. It also gathers findings on information seeking behaviour that were found in a wide range of research on evacuations, media use, internet use, perceptions of disaster and agency response, interpretations of disaster messages, and protective action, and created an information seeking focus.

## 7.4. Summary of the discussion

This study has answered important questions about information seeking in a disaster, principally, whether a model might explain this activity. The study incorporated extensive literature from disaster research to establish the current disaster information seeking landscape. Models found in the information seeking and disaster behaviour literature were used as a foundation to explain the step-by-step nature of information seeking, and how people undertake this activity. This landscape is strongly influenced by the background of the people involved in the disaster – where they grew up, their gender, education, age and income, whether they have experience with the disaster they face, their culture and their self efficacy and locus of control. It also showed that availability and ease of access to media, the currency of information available from that

source or form, and a range of other factors will affect how people look for and secure information to inform their actions. A disaster information seeking model was the product of an iterative process that reflected the social constructivist approach on which this study was based. Three phases of research were used to validate each component of the disaster information seeking model: in-depth interviews and a survey to plot information seeking behaviour against the model and a focus group to validate the new model's legitimacy as a planning tool for disaster communication practitioners. The next chapter will draw conclusions from the research, consider whether this study achieved its objectives, discuss the limitations of the study, and make recommendations for further research.

# 8. Conclusions

The previous chapter presented a summary of the findings of this study from both information behaviour and model development perspectives. This chapter will discuss the conclusions and implications of the research by returning to the central research questions and explaining how the research responded to each and achieved the objectives of the study. The previous chapter considered the central research questions in terms of results. This chapter will draw conclusions against whether the research achieved its aims and what this means for the field of knowledge and future research. Comparisons between the findings and the findings of other researchers, which were explored in the literature review, will be made. In the process, limitations will be outlined, and with this outline, implications for future research detailed. Implications for theory, practice and policy will also be explained and the originality of the research highlighted.

## 8.1. Did the research achieve its objectives?

The aim of this research was to find out how individuals in communities looked for information about a disaster affecting them, what sources they used, and which they preferred. It attempted to find a model that could assist emergency agencies identify information seeking behaviour in the impact phase of a disaster, which may then aid the development of communication plans for disasters in different regions.

The central research questions for this study were:

*How do people look for information during the impact phase of an emergency?*

a) *Can information models, which are well-established theory, be used to describe how people look for information during the impact phase of a disaster?*
b) *What information seeking patterns emerge from the impact phase of a disaster?*
c) *Can this knowledge extend known information theory and guide emergency agencies, as strategy and practice?*

This section will consider whether these were achieved by the study. The conclusions will be presented in bullet point form to emphasise the salient points to emerge from the study.

### *8.1.1. Can an information model describe information seeking in a disaster?*

- Two models from existing literature came close to allowing description of information seeking in a disaster – the **risk communication in natural hazards** model and the **problem-specific everyday life information seeking model**.
- However, it was necessary to tweak both models to account for all aspects of information seeking in a disaster.
- Emerging from the research was the disaster information seeking model.
- This model differed from the two original models in that it accommodated a discrete alert source, better explained the influence of sender and receiver characteristics , included exit points from information seeking in favour of other activities, and strengthened the feedback loop.
- In both the interview and survey stages of the study, the results could be plotted onto the model to provide a picture of information seeking behaviour.

### *8.1.2. What information seeking patterns emerge from the impact phase of a disaster?*

- Rapid onset disasters (such as bushfire, flash flood, tornado and earthquake) were characterised by a smaller range of forms and sources, with other people key amongst these.
- Rapid onset disasters were accompanied by a greater need for visual information to help the process of sensemaking – in the case of flash flood, what had happened, and in bushfire, where the fire was.
- Slower disasters such as slow flood, some storms or cyclone were characterised by a wider range of sources, with the internet and radio featuring as the most important.
- Other people were the most important source throughout the study – the challenge for agencies will be how to join other people as a key source, with social media as the fastest and most accurate source, to ensure communities have the best information.
- Newspapers were not useful in the warning /response phases of disaster, but their websites were highly useful.

- Social media was not a significant form of information for any group in any type of disaster.
- The mixed methods approach validated these results at several different levels – from the efficacy of the disaster information seeking model in explaining information seeking behaviour, to its usability by practitioners

### *8.1.3. What specific information seeking patterns emerged?*

- Specific information seeking patterns that emerged from the interviews were confirmed by the survey - these are well reported on pages 386-7 and 389-90.

### *8.1.4. Can this knowledge be used to extend theory and practice?*

- The disaster information seeking model fills a gap that was overlooked by recent crisis models such as the protective action decision-making model (decision making) and the social-mediated crisis communication model (interaction between an organisation and its publics during a crisis).
- The model developed in this study can be used with both of these models – the SMCC model coming into play at the form and source level, and the PADM model effective in describing disaster behaviour at the point where individuals use information to make a decision about preserving their own safety.
- At a practice level, this model allows practitioners to predict, and if they need to, prioritise, forms and sources depending on disaster type and situational circumstances – for instance, if power is lost, the prominence of other people as a key source can be used to distribute messages in a variety of creative ways.

## 8.2. Other benefits and achievements of the research

- The study used a unique mixed methods approach, that in addition to the more conventional interviews and survey, made use of a focus group to test the practicality of the model in the real world.
- Information seeking pathways established in the interview stage were supported by data from the survey. This allows us to assume that the information pathways reported in the survey for the five other disaster types (storm, mudslide, earthquake, tsunami and tornado) could be reliable, even if there were not predominant patterns in such a disaster.

- It also filled a gaping hole in Australian disaster information behaviour research.
- The current emphasis of agencies on social media as a (and sometimes the only) key communication tool was shown to be mistaken at this stage of the development of this form of communication.
- While the model was developed in an Australian context, it could be used to test information seeking pathways in other cultural settings because of its recognition of the situational factors specific to individuals, its ability to work in any disaster type, and its recognition that in some cases, information seeking is not necessarily the default reaction to news of a disaster. In other words, it acknowledges that the characteristics of the receiver may be such that the individual undertakes activity either very different to the Australian experience, and may undertake activity other than information seeking at any time during the reaction and response process that can be better explained by other models such as the Protective Action Decision-making Model (PADM) (Lindell & Perry 2012).

## 8.3. Limitations

This section will outline the limitations of the study, which included some problems during data collection and others that arose from the research design. It is necessary to visit these to ensure that replication of this research does not also repeat these shortcomings.

During the interviews, the interviewer occasionally led the respondents into an answer, instead of ensuring they clarified points in their own words. For instance, a respondent may have mentioned that he or she "switched on the news". Instead of asking the respondent to clarify in their own words, the interviewer asked the respondent if they meant a specific medium, such as 'ABC radio'. This did not present a problem in the manual thematic analysis, where the researcher could take this into account, but in the software analysis of the interview transcripts, this instance of a specific media would have been ignored by the software because it was uttered by the interviewer and not the respondent.

Secondly, failure to recruit young people, unemployed people and those from a low socio-economic background for the interviews may have prevented a range of information seeking behaviours from being presented. This was partially resolved in the

survey, but it did confirm the problems with the sampling methods that were expected in the research design phase. Thirdly, lack of resources prevented effective follow-up for the mailed survey, and most likely contributed to the low response rate of 3.7% for the mailed survey. This study found that distributing the survey online using social media yielded a much stronger response. However, this stronger online response created a reliance on the online survey, which reduced the validity of the method and restricted the number of analysis techniques that could be used on the data. Fourthly, the scope of this project, a PhD, prevented testing of the final version of the model – however, this will provide scope for future research, including making generalisations on information seeking behaviour.

## 8.4. Contributions to research

This study has made a contribution to the fields of disaster behaviour and information seeking by providing a model that can explain disaster information seeking. The study aligned research with practice by allowing practitioners to provide feedback on a model to ensure its usefulness to industry. The new model maps best approaches to communication with disaster-affected communities based on an understanding of how these communities can and prefer to receive information, and what information they look for. It also connects information seeking behaviour with a primary goal of emergency agencies, which is to trigger protective action in threatened or affected communities by way of communication.

This study is the first to investigate information seeking in a disaster in an holistic way. It examined every source and form of information available and reviewed the entire information picture, rather than focusing on one specific source or form (such as television, social media). Situational factors of information receivers and the characteristics of information sources and forms have been shown to have significant effect on disaster behaviour and information seeking starting with the literature review and continuing through the study. The study shows that agency communicators must know the demographic, cultural, social and economic factors of their community, and the nature of the information networks at play in that community in order to develop effective communication plans. In addition, the research has provided a multidimensional understanding of what information seeking in a disaster might look like – from the first alert through the confirmation phase, to importance of sources, what people were looking for, what might trigger some sort of action (looking for more information, deciding to look no further or taking protective action) and the sensemaking process involved. While improvements to the model can doubtless be

made as more research is undertaken, it does provide an effective framework for future information seeking studies.

## 8.5. Implications for further research

The development of the disaster information seeking model presents a range of opportunities for further research. Firstly, the model needs to be tested using both interviews and surveys to ensure that the changes made after the focus group phase of the research effectively contributed to the improvement of the model. In addition, a number of further questions arise:

- Does the model work in a practical setting to plot a community's information seeking behaviour?
- How do information seeking patterns change over the period of the disaster? Are there differences between early information seeking and later information seeking?
- Is the most important source of information the same as the source that triggers some sort of action?
- What are the triggers for action (such as preparation or evacuation)?
- How does each of the influences on source selection affect the information seeking process?
- Has the importance of social media increased since the interviews and survey for this study were undertaken?
- How can agencies harness the credibility of other people as sources of information and ensure that key 'other people' in each community have correct and reliable information to pass on?
- How can agencies harness the reliability, instantaneous and factual nature of social media to inform these "other people", as key sources, in order to spread their message?

## 8.6. Summary of the conclusions

The study achieved its aims in several ways: it established that a model could be used to describe and perhaps predict information seeking activity in a disaster. A feature of the study was that it used a mixed methods program to do this, looking at the model from the perspective of both the individual and the agency. It also established a number of information seeking pathways for nine different disaster types – in four of these,

interviews were supported by the survey data, which allows us to have faith in the information pathways established in five other disaster types.

The model was found to be useful in terms of understanding the individual's influences on preferred sources of information. While the model describes a time-sequenced step-by-step activity, it also describes a circular sequence of behaviour, with sources revisited as new information is received. The first steps of this sequential process, the information seeking pathway, was plotted for a number of disaster types, establishing the first of a range of disaster information seeking behaviours that were usually most influenced by disaster type. Because of this usability, the model will help practitioners understand the information channels and sequences used by their communities in a disaster.

The research built to develop the model has filled a gap in information seeking research in Australia. Knowledge of information seeking has previously been generated by information seeking questions within studies investigating other disaster behaviour, such as evacuation, physical response or recovery, mostly providing information on the first alert and/or the mainly used source. Sometimes a study would ask about the most helpful source, often without the other two questions. This study has provided an holistic view of the Australian information seeing in disaster picture.

A few limitations in conducting the research occurred that were due to lack of experience of the researcher or resourcing levels for the project. However, it is still a robust piece of work that has contributed both a model and data on information seeking that will be useful in future. It also uncovered a range of further research opportunities, the most pressing of which is the investigation of how the most predominant form and source across disasters, other people, can be harnessed with social media, which is the most reliable and speedy source at the disposal of agencies, but currently little used by the community in the response phase.

This research developed a clear picture of information seeking in Australian disasters, and a model by which to measure and predict information behaviour.

# 9. Appendices

## 9.1. Appendix 1 – Interview questions

### (Airlie Beach) interviews

1. Let's start by talking about how you get information day to day – what media and networks do you access?
2. Do you remember how you first heard about the (cyclone)?
3. Where did you go first for more information?
4. Where did you go next?
5. What people or media or other information sources did you go to?
6. What sources of information did you then use most as it progressed?
7. What became the sequence of your information seeking during the (cyclone)?
8. How much time did you spend looking for more information each day?
9. Was that all in one block or was it spread across the day?
10. What types of information did you need?
11. Did the type of media or network affect the type of information you were looking for?
12. Who did you talk to most about it?
13. Why?
14. What sort of information did you get from them? (ie new? Confirmation?)
15. Did this change during the (cyclone)?
16. What did you do with the information they gave you?
17. Did you receive conflicting information at any stage?
18. What did you do then?

MAPS: most important, secondary importance, marginal importance,

a. Level of importance
b. Why they were important
c. Strengths
d. Weaknesses

19. What were some of the obstacles to you getting information?
20. If there was a power or media failure, how and where did you get information?
21. Looking back now, would you do anything differently in the way you got information during the cyclone?
22. What information would you look for if this happened again?
23. Is there anything you want to add or that you think I should ask?

## 9.2. Appendix 2 – Demographic profile for interviews

This form was produced on University of South Australia letterhead.

| | | |
|---|---|---|
| Age: | | |
| Gender: | Male ☐ | Female ☐ |
| Occupation: | | |
| If employed, industry of employment: | Accommodation ☐<br>Food/bev'g services ☐<br>Health/associated ☐<br>Construction ☐<br>Transport/postal ☐ | Retail ☐<br>Tourism ☐<br>Community services ☐<br>Other ☐ |
| What is your highest level of education? | Primary school ☐<br>Year 11 or below ☐<br>Year 12 ☐<br>Certificate/diploma ☐ | Bachelor ☐<br>Postgraduate ☐ |
| Were you affected by the cyclone (flood, fire) | Yes ☐ | No ☐ |
| How? | | |
| Were you in the (x) region during the (cyclone, flood, fire)? | Yes ☐ | No ☐ |
| Do you live: | In (Airlie Beach)? ☐ | Outside (Airlie)? ☐ |
| Does anyone in your household or a direct relative (mum, dad, brother, sister, partner, daughter, son) for (Whitsundays) Regional Council or an emergency agency involved in the (cyclone/fire/flood) response? | Yes ☐ | No ☐ |
| If yes, how involved where they in the emergency response during and after the (cyclone/fire/flood)? | Very much ☐<br>Some involvement ☐<br>Not much ☐<br>Not at all ☐ | |

## 9.3. Appendix 3 - Research consent form

This form was produced on University of South Australia letterhead.

# Research Consent Form

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**Communicating with the community during a disaster: exploring how affected people get information during an emergency**

The information about this study has been given to me. I have received satisfactory answers to all the questions I have asked.

I agree to be interviewed for this study. I know that I can choose not to answer any question, or stop at any time. I understand that all the information provided by me is treated as confidential and will not be released by the researcher unless your permission is sought or the researcher is required to do so by law.

☐ I am happy for this interview to be audio taped.

☐ I am not willing for this interview to be audio taped.

☐ I consent to material from this interview being used to make generalisations about how people get information when their community is in a disaster.

☐ I understand that I will not be identified in any way in material that is developed from this research.

☐ I would like to receive a summary or copy of the study. Please send a copy to me at:

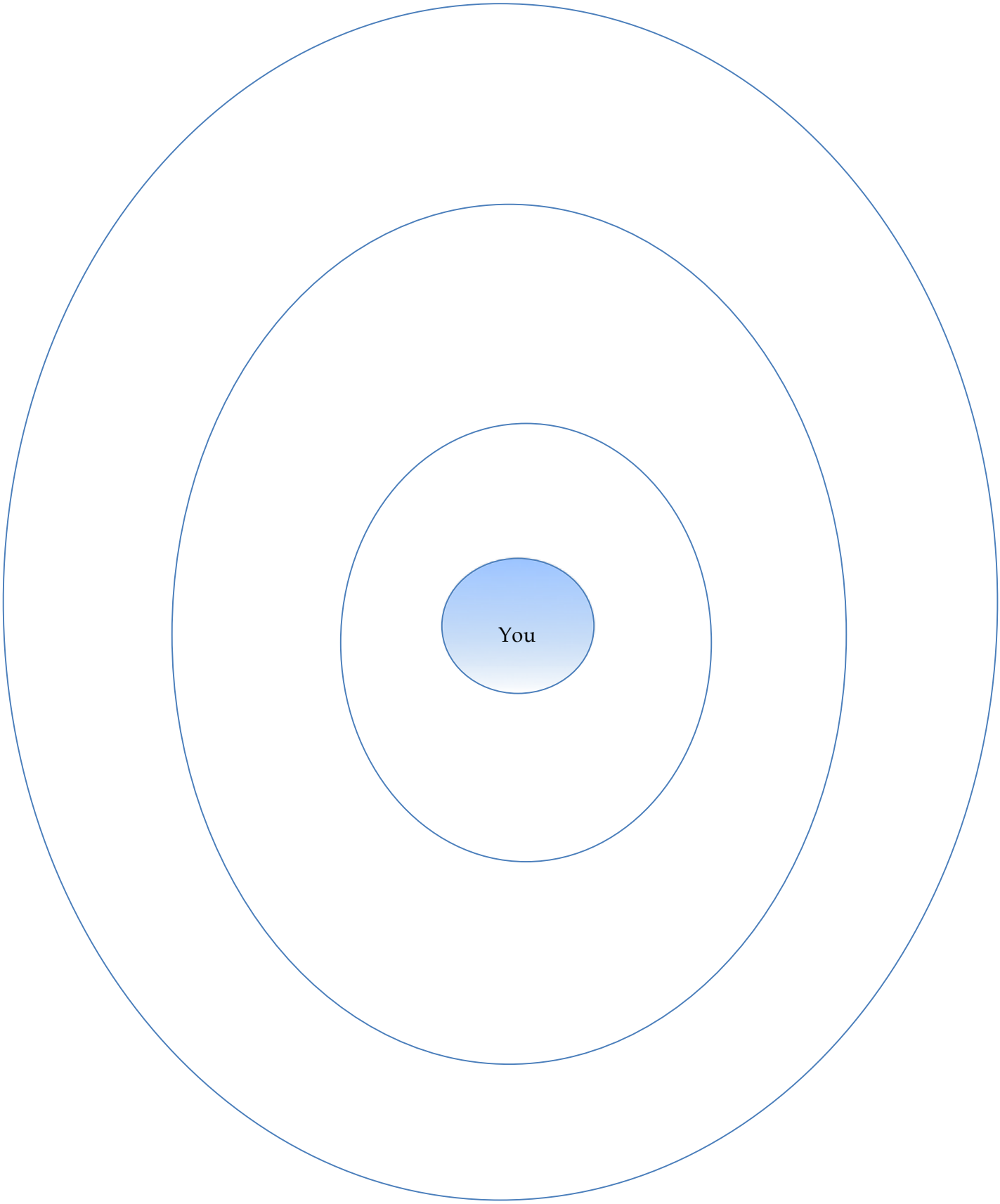
Name: _____

Address/contact: _____

Participant (sign): _____ Date:

Investigator: Barbara Ryan Date:

## 9.4. Appendix 4 – Source horizons diagram



## 9.5. Appendix 5 – Interview transcript coding schema

| Alert | Forms | Bushfire | Cyclone | Slow flood | Flash flood |
|---|---|---|---|---|---|
| | A1. Other people phone/text | | | | |
| | A2. Others f2f | | | | |
| | A3. Others Facebook/email | | | | |
| | A4. Environmental cues | | | | |
| | A5. Agency contacts | | | | |
| | A6. Agency social media | | | | |
| | A7. Other social media | | | | |
| | A8. BOM website | | | | |
| | A9. Other weather website | | | | |
| | A10. Other agency website | | | | |
| | A11. Agency text or phone warning | | | | |
| | A12. Local radio ABC | | | | |
| | A13. Local radio commercial | | | | |
| | A14. Television | | | | |
| | A15. Newspaper | | | | |
| Source preference criteria | S1. Message – source/channel | | | | |
| | S2. Message consistency | | | | |
| | S3. Message accuracy | | | | |
| | S4. Message clarity | | | | |
| | S5. Message certainty | | | | |
| | S6. Message guidance | | | | |
| | S7. Message frequency | | | | |
| | S8. Environmental cues/situation | | | | |
| | S9. Social setting | | | | |
| | S10 Social ties | | | | |
| | S11. Proximity/location | | | | |
| | S12. Age | | | | |
| | S13. Gender | | | | |
| | S14. Education | | | | |
| | S15. Race/ethnicity | | | | |
| | S16. Resources | | | | |
| | S17. Cognitive abilities | | | | |
| | S18. Experience | | | | |
| SPC | S19. Locus of control | | | | |
| Confirm | C1. Other people phone/text | | | | |
| | C2. Others f2f | | | | |
| | C3. Others Facebook/email | | | | |

| Alert | Forms | Bushfire | Cyclone | Slow flood | Flash flood |
|---|---|---|---|---|---|
| | C4. Environmental cues | | | | |
| | C5. Agency contacts | | | | |
| | C6. Agency social media | | | | |
| | C7. Other social media | | | | |
| | C8. BOM website | | | | |
| | C9. Other weather website | | | | |
| | C10. Other agency website | | | | |
| | C11. Agency text or phone warning | | | | |
| | C12. Local radio ABC | | | | |
| | C13. Local radio commercial | | | | |
| | C14. Television | | | | |
| | C15. Newspaper | | | | |
| Main | M1. Other people phone/text | | | | |
| | M2. Others f2f | | | | |
| | M3. Others Facebook/email | | | | |
| | M4. Environmental cues | | | | |
| | M5. Agency contacts | | | | |
| | M6. Agency social media | | | | |
| | M7. Other social media | | | | |
| | M8. BOM website | | | | |
| | M9. Other weather website | | | | |
| | M10. Other agency website | | | | |
| | M11. Agency text or phone warning | | | | |
| | M12. Local radio ABC | | | | |
| | M13. Local radio commercial | | | | |
| | M14. Other website | | | | |
| | M15. Newspaper | | | | |
| | M16. Television | | | | |
| What? | W1. Location/pathway of incident | | | | |
| | W2. Severity | | | | |
| | W3. Others safe/how they fared | | | | |
| | W4. Own property safe/damage | | | | |
| | W5. Community/business property safe/damage | | | | |
| | W6. Power on | | | | |
| | W7. When get back to property | | | | |
| | W8. Routes for travel | | | | |
| | W9. When non-power services back on/open | | | | |

| Alert | Forms | Bushfire | Cyclone | Slow flood | Flash flood |
|---|---|---|---|---|---|
| | W10. Where/when to get supplies (fuel, food etc.) | | | | |
| | W11. Preparation | | | | |
| | W12. Government support | | | | |
| | W13. Rumour debunking/ confirmation | | | | |
| | W14. What happened? | | | | |
| | W15. Others' experience | | | | |
| | W16. Evacuation | | | | |
| | W17. What agencies were doing | | | | |
| | W18. Further weather | | | | |
| Sense-making | S1. Sensemaking employed? | | | | |
| | S2. Stopped looking | | | | |
| | S3. Too busy to look for info | | | | |
| Triggers | T1. Proximity - environmental cues | | | | |
| | T2. Proximity – news from others | | | | |
| | T3. Proximity - time | | | | |
| | T4. Proximity - media | | | | |
| | T5. Time | | | | |
| | T6. | | | | |
| | T7. Source (such as family) | | | | |
| | T8. | | | | |
| Other useful sources | O1. Other people phone/text | | | | |
| | O2. Others f2f | | | | |
| | O3. Others Facebook/email | | | | |
| | O4. Environmental cues | | | | |
| | O5. Agency contacts | | | | |
| | O6. Agency social media | | | | |
| | O7. Other social media | | | | |
| | O8. BOM website | | | | |
| | O9. Other weather website | | | | |
| | O10. Other agency website | | | | |
| | O11. Agency text or phone warning | | | | |
| | O12. Local radio ABC | | | | |
| | O13. Local radio commercial | | | | |
| | O14. Television | | | | |
| | O15. Newspaper | | | | |
| | O16. Other | | | | |

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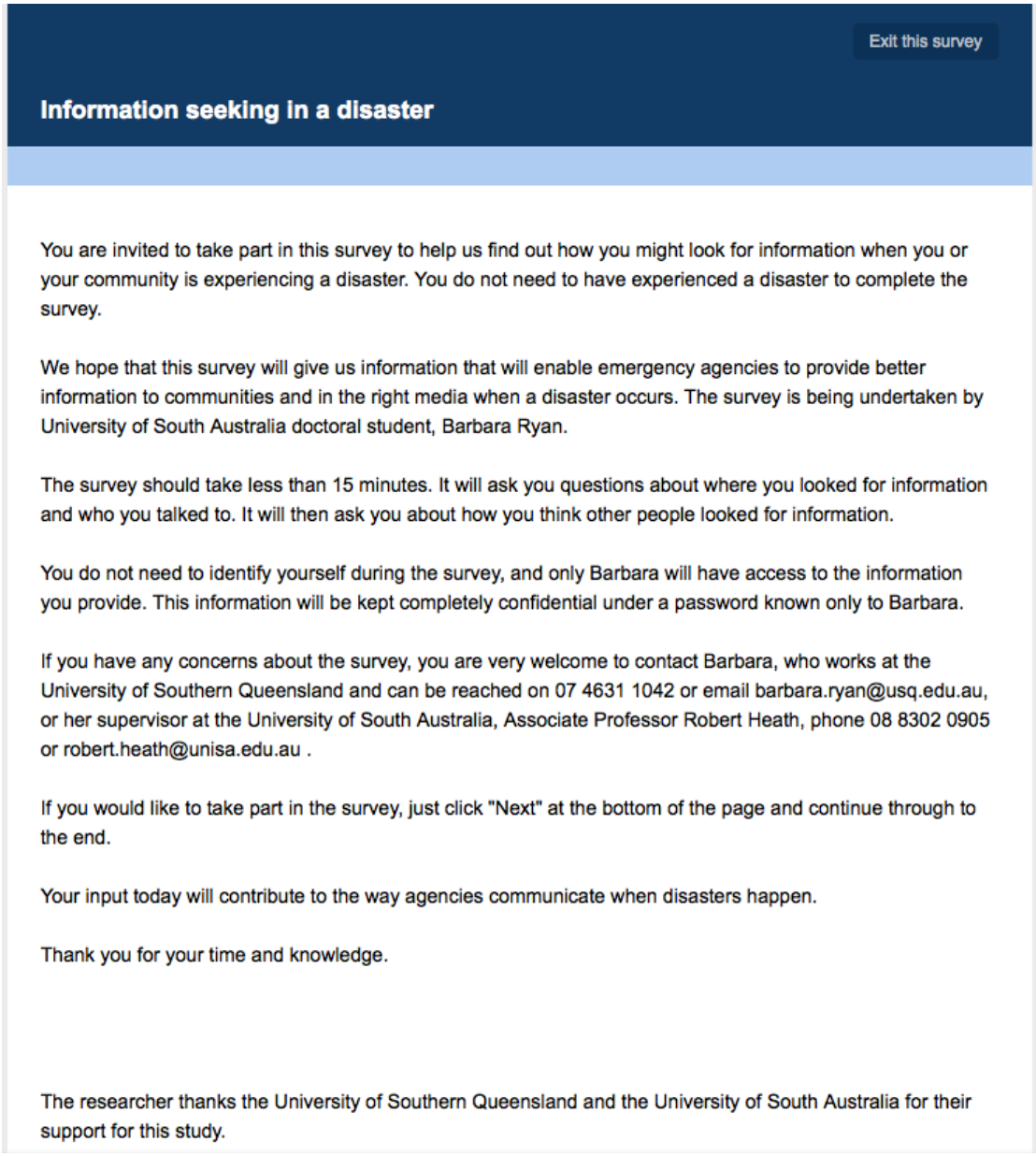
## 9.6. Appendix 6 – Online survey covering letter



Exit this survey

**Information seeking in a disaster**

You are invited to take part in this survey to help us find out how you might look for information when you or your community is experiencing a disaster. You do not need to have experienced a disaster to complete the survey.

We hope that this survey will give us information that will enable emergency agencies to provide better information to communities and in the right media when a disaster occurs. The survey is being undertaken by University of South Australia doctoral student, Barbara Ryan.

The survey should take less than 15 minutes. It will ask you questions about where you looked for information and who you talked to. It will then ask you about how you think other people looked for information.

You do not need to identify yourself during the survey, and only Barbara will have access to the information you provide. This information will be kept completely confidential under a password known only to Barbara.

If you have any concerns about the survey, you are very welcome to contact Barbara, who works at the University of Southern Queensland and can be reached on 07 4631 1042 or email barbara.ryan@usq.edu.au, or her supervisor at the University of South Australia, Associate Professor Robert Heath, phone 08 8302 0905 or robert.heath@unisa.edu.au .

If you would like to take part in the survey, just click "Next" at the bottom of the page and continue through to the end.

Your input today will contribute to the way agencies communicate when disasters happen.

Thank you for your time and knowledge.

The researcher thanks the University of Southern Queensland and the University of South Australia for their support for this study.

## 9.7. Appendix 7 – Survey instrument

**1. What country do you live in?**

☐ Australia Other

**2. If you live in Australia, what is your postcode?**

**3. What is your age?**

**4. What is your gender?**

☐ Male ☐ Female

**5. What is your partnership status? *Select one.***

☐ Married or in a partnership ☐ Single

**6. How many people live in your household? *Select one.***

☐ 1 ☐ 2 ☐ 3-4 ☐ 5 or more

**7. How many of these are dependents (children, elderly, disabled)? *Select one.***

☐ None ☐ 1-2 ☐ 3-4 ☐ 5 or more

**8. What is your level of education? *Select one.***

☐ Up to Year 12 ☐ Tertiary TAFE or other ☐ Tertiary university

**9. What is your yearly household income? *Select one.***

☐ Less than $30,000 ☐ $30-$80,000 ☐ $80-$100,000 ☐ $100,000+

**10. Identify the type of area you live in (*select one*):**

☐ City/suburban ☐ Semi-rural ☐ Rural

**11. Has your community experienced a disaster in the past two years?**

☐ Yes ☐ No

**If you answered 'No' to the previous question, go to Question 14 on the next page, considering how you think you would look for information in a disaster.**

**12. What was the most recent disaster your community has experienced? *Select one.***

☐ Sudden storm ☐ Bushfire ☐ Flash flood ☐ Slow flood

☐ Earthquake ☐ Cyclone/hurricane/typhoon ☐ Tsunami

**13. Were you asked by agencies to evacuate your home or workplace?**

☐ Yes ☐ No

**In this section, we will ask questions about how you looked for information and what you looked for.**

**14. How did/would you first become aware of the/a disaster? *Select one.***

☐ Direct contact with friends, family, neighbours – face-to-face, phone calls/texts, Skype etc.

☐ Indirect contact with friends, family, neighbours – email, social media

☐ Seeing the disaster such as water or smoke

☐ Personal contacts in emergency/council agencies or staff in the field

☐ Emergency agency social media

☐ Emergency agency or council website

☐ Agency emergency text/phone message

☐ Radio

☐ Television

☐ Newspaper

☐ News or weather website

**15. Where did/would you THEN turn to for more information? *Select one.***

☐ Direct contact with friends, family, neighbours – face-to-face, phone calls/texts, Skype etc.

☐ Indirect contact with friends, family, neighbours – email, social media etc.

☐ Seeing the disaster such as water or smoke

☐ Personal contacts in emergency agency/council or staff in the field

☐ Emergency agency or council social media

☐ Emergency agency or council website

☐ News or weather website

☐ Radio

☐ Television

☐ Newspaper

**16. Which information sources would/did you come to rely on most?**

**Please rate each of these sources from 1 to 5 in terms of importance, where 1 was of NO importance and 5 was MOST important.**

**Circle one number for each source.**

| | No importance | Of little importance | Somewhat important | Very important | Most important |
|---|---|---|---|---|---|
| Direct contact with friends, family, neighbours – face-to-face, phone calls/texts, Skype etc. | 1 | 2 | 3 | 4 | 5 |
| Indirect contact with friends, family, neighbours – email, social media | 1 | 2 | 3 | 4 | 5 |
| Seeing the disaster such as water or smoke | 1 | 2 | 3 | 4 | 5 |
| Personal contacts in emergency/council agencies or staff in the field | 1 | 2 | 3 | 4 | 5 |
| Emergency agency social media | 1 | 2 | 3 | 4 | 5 |
| Emergency agency or council website | 1 | 2 | 3 | 4 | 5 |
| Agency emergency text/phone message | 1 | 2 | 3 | 4 | 5 |
| Local radio | 1 | 2 | 3 | 4 | 5 |
| Non-local radio | 1 | 2 | 3 | 4 | 5 |
| Local television | 1 | 2 | 3 | 4 | 5 |
| Non-local television | 1 | 2 | 3 | 4 | 5 |
| Local newspaper | 1 | 2 | 3 | 4 | 5 |
| Non-local newspaper | 1 | 2 | 3 | 4 | 5 |
| News or weather website | 1 | 2 | 3 | 4 | 5 |

**17. In the previous question, if you gave friends, family or neighbours a rating of '3' or more, how did/would you mostly communicate with them? *Select one.***

☐ Landline telephone ☐ Mobile telephone voice ☐ Mobile telephone text

☐ Email ☐ Social media ☐ Skype or similar

☐ Face-to-face

**18. Once you heard about the disaster, how long was/would it be before you looked for further information?**

☐ Less than one hour ☐ 1-2 hours ☐ 2-4 hours

☐ One day ☐ More than one day ☐ More than several days

**19. If you did/would look for more information, what were you trying to find out?**

***Please rank from most important (1) to least important (4).***

☐ What has happened? ☐ What is going to happen?

☐ What should I do next? ☐ What should I do now?

**In this section we ask questions about how you have sought information when friends or family have been involved in a disaster outside your own area.**

**20. In the past two years, have you attempted to contact friends or family who were living in an area that was hit by a disaster?**

☐ Yes ☐ No (if you selected No, go to question 22)

**21. How did you do this? *Select up to two.***

☐ Mobile phone - voice ☐ Landline telephone

☐ Mobile phone – text message ☐ Email

☐ Social media ☐ Skype or other VOIP facility

☐ Via other people ☐ Posted letter

☐ Called police or another agency

***That completes the survey…thank you!***

# 9.8. Appendix 8 – Mailed survey covering letter

University of
South Australia

Dear Resident,

You are invited to take part in the enclosed survey to help us find out how you seek information ***when you or your community is experiencing a disaster***. We hope that this survey will give us information that will enable emergency agencies to provide better information to communities and in the right media when a disaster occurs. The survey is being undertaken by University of South Australia doctoral student, Barbara Ryan.

**School of Management**
Adelaide
South Australia 5000
GPO Box 2471
Adelaide
South Australia 5001
Australia
t: +61 8 8302 0524
f: +61 8 8302 0512
e: mgn.enquiries@unisa.edu.au
www.unisa.edu.au
CRICOS Provider Number 00121B

The survey should take less than 15 minutes. It will ask you questions about where you looked for information and who you talked to. It will then ask you about how you think other people looked for information.

> *You **do not need to identify yourself** during the survey, and only Barbara will have access to the information you provide. This information **will be kept completely confidential** and under lock and key.*

If you have any concerns about the survey, you are very welcome to contact Barbara, who works at the University of Southern Queensland and can be reached on 07 4631 1042, or her supervisor at the University of South Australia, Associate Professor Robert Heath, phone 08 8302 0905.

If you would like to take part in the survey, just fill in the attached form. Once you have completed the survey, put it into the Reply Paid envelope provided and **send it via Australia Post, free of charge, by Friday, September 21.** You do not need to put a stamp on this envelope.

Your input today will contribute to the way agencies communicate when disasters happen.

Thank you for your time and knowledge.

Kind regards,

Barbara Ryan
PhD candidate
University of South Australia

*for*
Associate Professor Robert Heath
School of Management
University of South Australia

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